FOOD ENGINEERING

May 1954

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35 CENTS

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Food Engineering

Vol. 26 • MAY, 1954 • No. 5

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FOOD ENGINEERING
(Formerly Food Industries)
May 1954 Vol. 26, No. 5
Member ABC and ABP
Published Monthly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. **Publication Office 99-129 N. Broadway, Albany 1, N. Y.**
Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York, 36, N. Y. Donald C. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President & Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice-President, Publications Div.; Ralph B. Smith, Vice-President and Editorial Director; Nelson Bond, Vice-President & Director of Advertising; J. E. Blackburn, Jr., Vice-President & Director of Circulation.
Subscriptions: Address correspondence to Food Engineering—Subscription Service, 99-129 N. Broadway, Albany 1, N. Y. or 330 W. 42nd St., New York 36, N. Y. Allow one month for change of address.
Subscriptions are solicited only from the executives, engineers, and technologists in food processing plants. Position and company connection must be indicated on subscription orders.
Single copies 35¢. Subscription rates—U. S. and possessions $2 for 1 yr., $3 for 2 yr., $4 for 3 yr. Canada, $3 for 1 yr., $4 for 2 yr., $5 for 3 yr. Other Western Hemisphere countries $10 for 1 yr., $16 for 2 yr., $20 for 3 yr. All other countries, $15 for 1 yr., $25 for 2 yr., $30 for 3 yr. Entered as 2nd class matter Aug. 26, 1948, at Post Office at Albany, N. Y. under Act of Mar. 3, 1879. Printed in U.S.A. Copyright 1954 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved.

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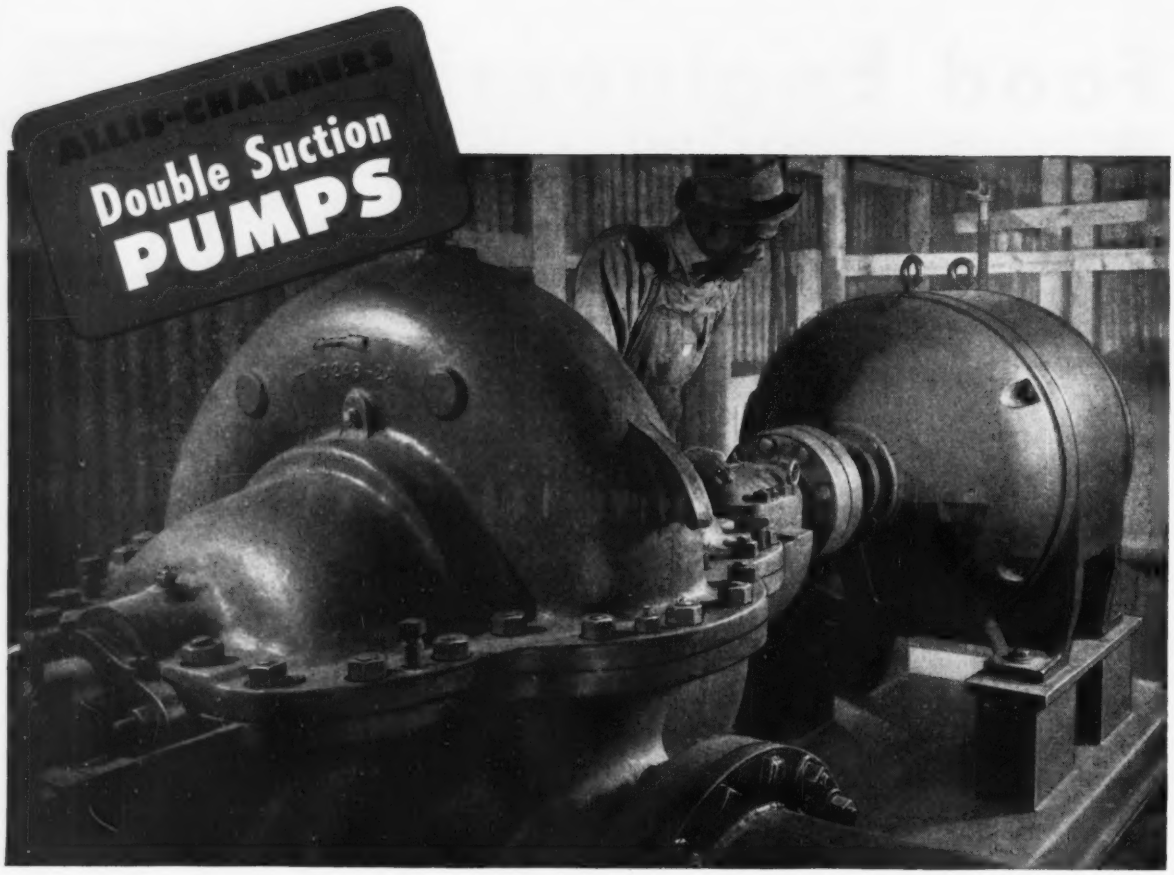

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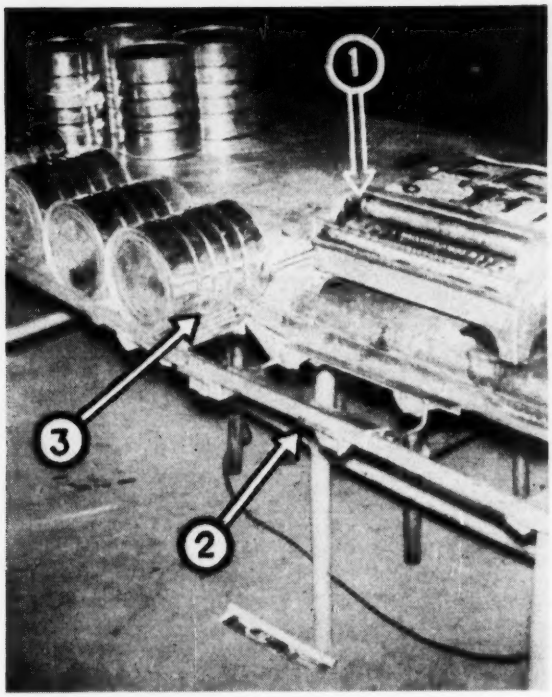
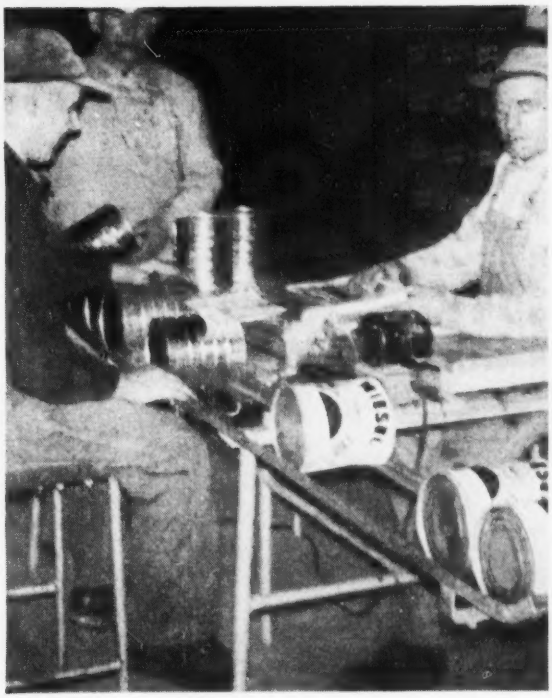
PRACTICAL IDEAS





Efficient No. 10 Can Labeler

When a plant's output in No. 10 cans is so limited that the purchase of a large capacity fully-automatic labeler is not justified, here's an economical way to label the small volume.

In our plant, like most others with limited No. 10 production, spot labeling of tins was done on a flat top table. Adhesives were brush applied to the labels by hand and then labels were passed to another worker who applied them to the cans.

Then we constructed a simple spot-labeling table on which was mounted a Diagraph-Bradley gummer. This speeded up our labeling of No. 10 tins by approximately 50%.

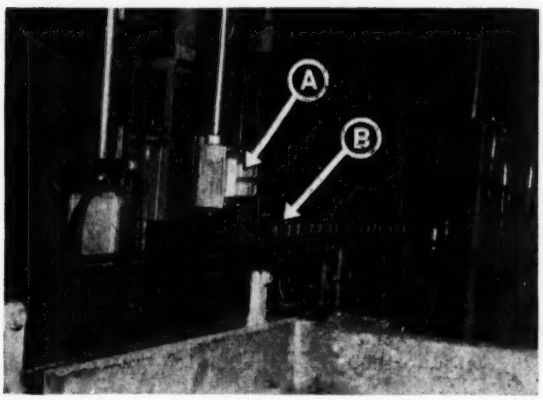
Gumming machine—(1) in left photo—is located in a recessed portion of the table to expedite label feeding. Crossing path of labels issuing from gummer is a tilted track (2), on which cans roll past label gumming station.

Only one can at a time rolls in place in front of the gummer; remainder of line of cans is retained by a stop (3).

After label is applied, can rolls over a trip which when actuated, drops the stop to permit another container to roll in position in front of the gummer.

This is the procedure which has speeded labeling. One worker (see right photo) places unlabeled cans on track, another feeds labels to gummer which deposits gummed labels on No. 10 tins. A third worker adjusts the labels to proper position, and a fourth removes containers at the discharge end of the track.

No attempt has been made to establish a maximum capacity for the table. However, during normal operations, 125 cases of six No. 10 cans are labeled per hour.—*D. E. Greb, Manager, Coleman Div., Country Gardens, Inc., Coleman, Wisconsin.*



"No Bottle-No Fill" Device

By means of a pivoted rod—so arranged that it operates an electric control, we stop our rotary filler whenever there is not a sufficient number of containers lined up ahead of the filler, in a solid row.

Formerly, when there was an interrupted flow of bottles, an operator had to press a button (A) to stop the filling machine.

Now, bottles traveling along a conveyor engage the pivoted arm (B). Pressure of the moving bottles swings this spring-return arm on its pivot to operate an electric switch in the circuit of the filler motor. If no bottle is under the pivot arm, the arm drops and the filler stops, avoiding spillage.—*Archibald F. Beith, Master Mechanic, Refined Syrups & Sugars, Inc., Yonkers, N. Y.*

paint-up clean-up center for GATX tank cars

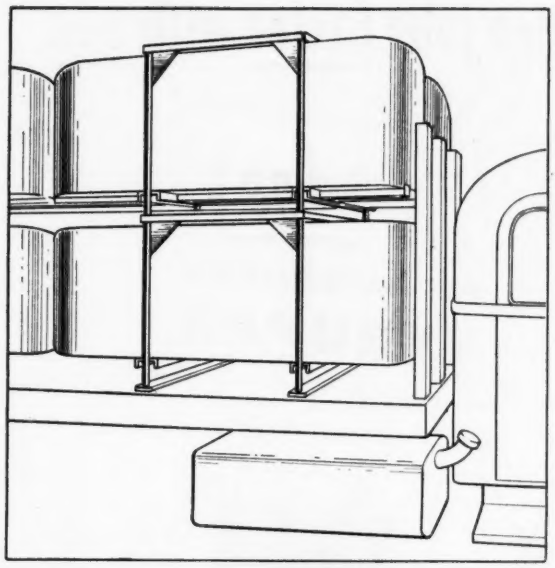
Forty tank cars can be serviced in this paint shop at one time. Every surface—interior and exterior—that can be painted, sprayed or brushed gets its protective covering here. After the car has gone through the mechanical department for necessary maintenance and repair work the important car reporting marks, advertising decoration and other stencilled information are applied. These surface finishes applied at the General American car repair shops increase the usefulness of the 47,000 GATX tank cars and keep cars available for duty.

To keep the fleet rolling, General American's more than 30 car repair shops work with the Engineering and Traffic departments to give shippers more dependable service for transporting liquids in bulk.

Car repair shops throughout the U. S. A.

GATX GENERAL AMERICAN TRADE MARK

GENERAL AMERICAN TRANSPORTATION CORPORATION
135 South La Salle Street, Chicago 90, Illinois
Offices in principal cities



Bulk Containers Cut Handling Costs

To prevent the deterioration of peas between the vining station and processing, Birds Eye Snyder Division of General Foods Corporation has developed special metal containers for storing and handling pre-cooled vined peas.

At the vining stations in the field, shelled peas are put into wooden pea boxes which hold 35-50 lb. each. The boxes are palletized and loaded on to trucks for transportation to the processing plant. At the plant a fork-lift truck unloads the palletized pea boxes, thus reducing the double handling of these small units.

Peas must either be processed immediately after vining or pre-cooled to a quality safe holding temperature to insure there will be no deterioration. Pre-cooling is an operation developed for this purpose. It consists of immersing peas in 33-35 deg. F. water until they are stabilized and field heat removed.

After pre-cooling, peas will retain their quality for approximately 24 hr. Also of considerable importance to the packer is the fact that peas pre-cooled by this method can be handled in containers of much greater capacity than the 30-50 lb. wooden box units.

Birds Eye's Industrial Engineering Department designed a large metal oblong-round tank contained in a supporting framework of steel. When a fork-lift truck is used, these units can be double-tiered for hauling or for storage in the confined space of most refrigerated pre-cooling rooms. The completely independent steel framework is designed to carry weight thus eliminating any tendency for a crushing load on the galvanized iron tank body.

The "up-ended" channel iron at the top forms a safe resting place for the ground or lower support member of the upper tank in the tier.

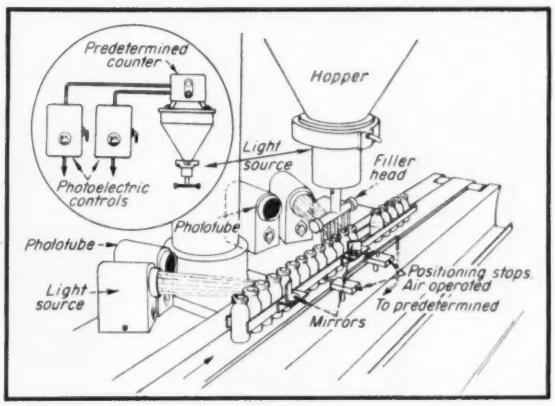
Since adopting these tanks, it is possible to obtain twice the utilization from the pre-cooling capacity. One hundred ninety pounds of peas per sq. ft. can now be stored where only 100 lbs. storage was possible when wooden pea boxes were used.

Each tank unit weighs 240 lb., stands 35 in. high and is 75 in. long and 37 in. wide, and is made of 16 gauge galvanized iron, with flat bottoms and equipped with a 4x6 in. opening at one end. A slide valve over this opening makes it possible to readily discharge the contents.

Containers are loaded and unloaded on the trucks from either side. When trucks were loaded with 200 wooden boxes of pre-cooled peas, net load capacity was 6,000 lb. Now with pre-cooled peas stored in tanks holding about 1700 lb. each, 9 tanks on the same truck have a total capacity of 15,000 lb.

Furthermore, a load of these metal containers properly secured present no problem at relatively high speeds on the highway. Unloading is quite simple with a fork-lift truck.

When unloading tanks, they are positioned with the outlet over an opening to a pump which is designed to convey the peas through a 4 in. pipeline to the processing equipment. Gate can be regulated for any desired rate of flow. Water from a flexible hose is directed into the open top of the tank and as the water filters to the bottom of the tank, and out of the open gate, it carries the peas with it into the pump.—*Henry W. Shrader, Plant Engineer, Birds Eye, Waseca, Minnesota.*



Control for Precision Filling

Whether one or as many as six small containers are filled simultaneously, the problem of accurately positioning for filling without upsetting can be readily solved by photoelectric controls. These instruments permit indexing without physically contacting the containers. Obstruction of light beams by the units stops them and starts the filling operation.

Two small photoelectric controls (see sketch) are placed along the back of conveyor. One photoelectric control is a high-speed type responding instantly to light beam interruptions or completion. The second is a delayed action photo electric timer which responds only after the light beam has been interrupted for a predetermined interval of time.

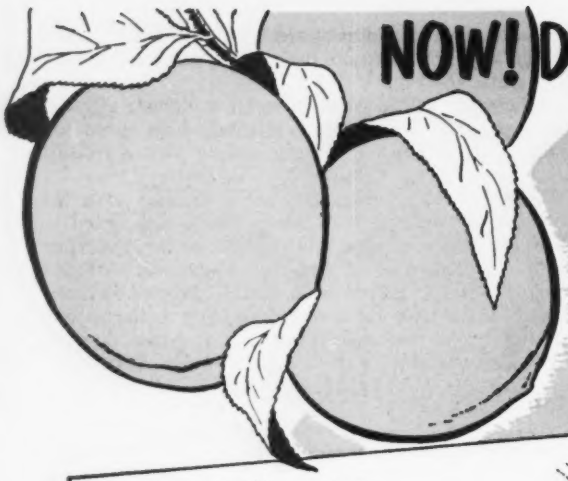
To minimize interference with the operator each beam is reflected by a small mirror to its associated control.

The conveyor is in continuous motion and two electropneumatic plungers control movement of the container units with reference to the conveyor. The right-hand one stops the line of empties in position for filling, and the left-hand one holds back the empties behind the containers just filled, until the conveyor has removed the filled units.

The high-speed photoelectric control beam is located at the right-hand stop, and the delayed action beam at the left-hand stop.

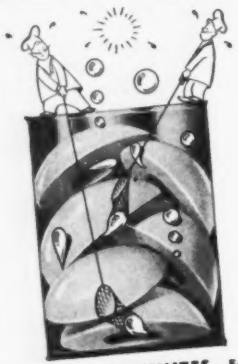
When the first containers in the line of empties meet the right-hand stop and simultaneously break this beam, the photoelectric control starts a predetermined counter. This counter controls the number of revolutions of a rotating feed screw which measures out a specific quantity of material to the filling spouts at each revolution.

After the prescribed number of revolutions which varies according to the material and package size, the predeter-

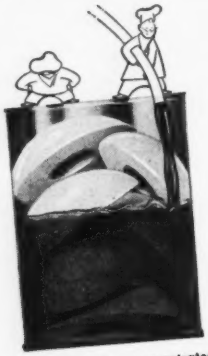


NOW! Do two jobs faster with one

PRE-VACUUMIZING SYRUPER

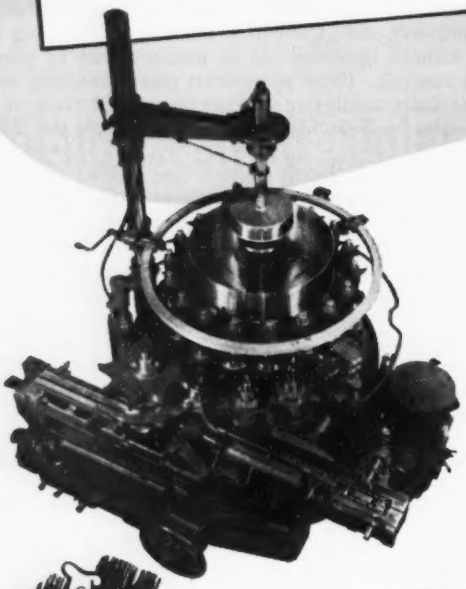


1 PRE-VACUUMIZES. Free and entrapped air is quickly removed from can and product cavities.



2 SYRUPS. Syrup penetrates rapidly and uniformly throughout the can.

3 FINAL VACUUMIZING AND CONTROLLED FILLING. All residual air is released, every can is accurately syruped to a positive head space.



Now You Can Syrup and Vacuumize a Host of Canned Food Products on *One* Compact Machine— *To a Uniform Fill, at High Speed and Low Cost*

The new precision-built 18 valve FMC filler greatly steps up operating efficiency in the canning of quality fruits and vegetables. This equipment combines vacuumizing and syruping operations in one compact unit, to meet the most rigid requirements for high-speed, thorough syrup penetration and complete release of entrapped air. Filled cans are conveyed directly from syruper to the closing machine. Every can is syruped to an accurate head space level for complete uniformity. Spillage and waste are eliminated by the well-known FMC "No can—No fill" mechanism. Polished stainless and alloy contact parts resist wear, are easily accessible for cleaning and maintenance, and provide highest standards of sanitation.

The FMC No. 18 Pre-Vacuumizing Syruper smoothly handles can sizes from 211 to 404 diameter, 300 to 704 height—at speeds up to 275 cpm, depending on can size.

Plan to get *all* the facts on this equipment *today!*

Write for new bulletin, or call your nearest FMC representative.

FOOD MACHINERY AND CHEMICAL CORPORATION

Canning Machinery Division

General Sales Offices:

WESTERN: SAN JOSE 6, CALIFORNIA **EASTERN:** HOOPESTON, ILLINOIS

mined counter stops the filling operation by disengaging the feed screw clutch.

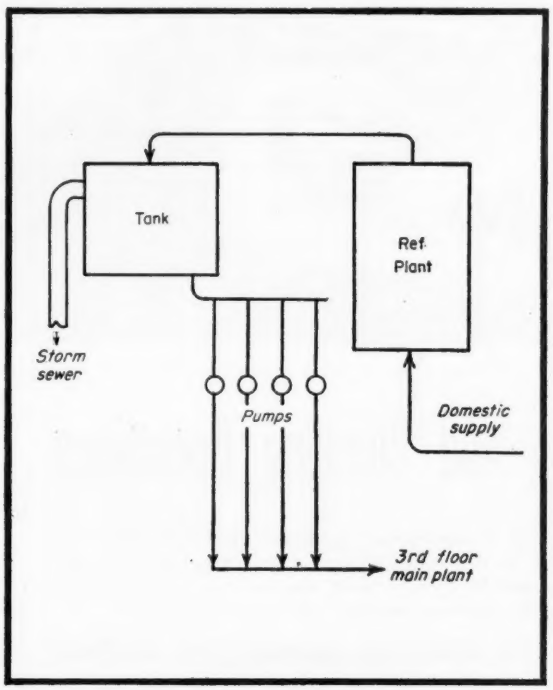
Simultaneously, the left-hand stop extends and the right-hand stop retracts, holding back the line of empty containers and allowing the continuously running conveyor to move those filled.

As soon as the filled units pass out of the beam the photoelectric control reverses the stop positions allowing the movement of empty containers into filling position against the right-hand stop. Filling cycle repeats when the leading empty container again breaks the right-hand beam.

In the event that a lapse in the container supply has allowed too few empties to reach the filling position, the second photoelectric control prevents the filling operation from starting.

This delayed type control responds only after its beam has been broken for a pre-set length of time. Thus breaking the right-hand beam starts the filling only when the left-hand beam has been continuously obstructed by the line of empties.

Should a gap appear in this line, filling cannot start until the gap has been closed and there is a full line between the two photoelectric beams.—*Photoswitch, Inc., Cambridge, Mass.*

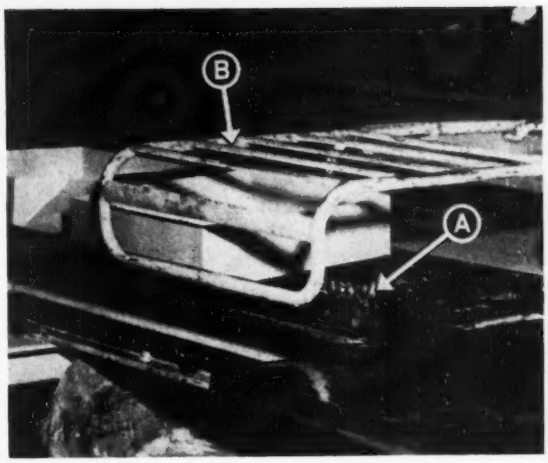


Makes Water Work Twice

Water conservation has become a must in food manufacturing and processing plants, for two reasons—scarcity of supply and operating economy.

So Seabrook Farms, Bridgeton, N. J., is making double use of the water that supplies the ammonia condensers and compressor cooling jackets in its large refrigeration plant.

Well water at 55 deg. F. goes first to the refrigeration plant, then is discharged at 70 deg. F. into a storage and surge tank. Pumps draw water from the bottom of this tank and deliver it to the process area on the third floor of the main plant. Any excess supply of water from the refrigeration plant goes to a storm sewer through an overflow pipe.—*FE staff.*

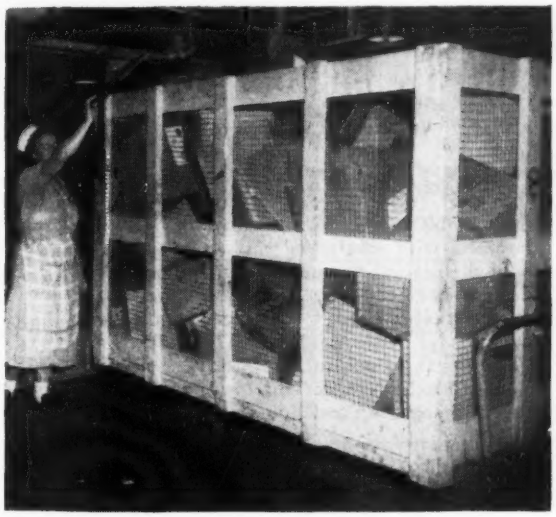


Guard Prevents Injury Hazard

At our bakery, we spotted—and in time to avoid any injury—an accident hazard to girls working on the cake-packing line. This particular packing line comprises a 1½ x 50 ft. plastic-coated conveyor belt, which is flanked on each side by chain belt with ½ in. flights spaced 1 ft. apart. Cakes are conveyed to packers on the plastic belt and cartons on the chain belts.

The accident hazard was the area—on each side of the cake conveying belt—where the chain belt and flights round the pulley (A in photo above).

To eliminate this hazard, we installed a shop-made dual safety gate (B). Each half-gate is 1 x 2½ ft. and constructed of ¼ in. metal rods. Gate is bolted to the center of the packing table and hinged so that each half swings from a vertical to horizontal position to guard the pulley end of each chain belt.—*Chas. Walker, Cake Production Superintendent, Fischer Baking Co., Asbury Park, N. J.*



Empty-Case Handling Labor Reduced

Wood-frame, wire screen bodies erected on hand trucks at small expense, have reduced the labor previously required at our plant to remove from the packaging line, empty cases in which folding cartons are delivered.

Formerly, five workers were necessary to gather empty

How To Improve Your Wrapping and Bundling Operations

Send For your free copy of the new Technical Service Bulletin No. 25 . . "WRAPPING AND BUNDLING". This informative Bulletin is crammed with *interesting facts* . . up-to-date data about the various machines available, speeds, operations performed, best Adhesives to use, etc. A few subjects covered are: "Classification of Wrapping Methods", "Types of Materials", "Machines for Wrapping and Bundling", "Selecting the Right Machine", "Methods in Various Industries", "The Most Popular Wrapping and Bundling Adhesives".

Here, then, is your opportunity which may point the way toward improved wrapping and bundling operations for *your* plant! Technical Service Bulletins are one of the many Scientific Adhesive Services performed by Paisley. Will you use company stationery when you write for Bulletin No. 25, please?

FREE ADHESIVE CONSULTING SERVICE

Write for our "Adhesive Operation Data Sheet". Return it promptly with all information requested. This Data Sheet is your guide to getting the ONE best, most efficient Adhesive for the specific operation you describe. Trial shipment will be sent ON APPROVAL, if desired. This skilled consulting service does not obligate you. It's the *SURE* . . the *MODERN* way to buy Adhesives!

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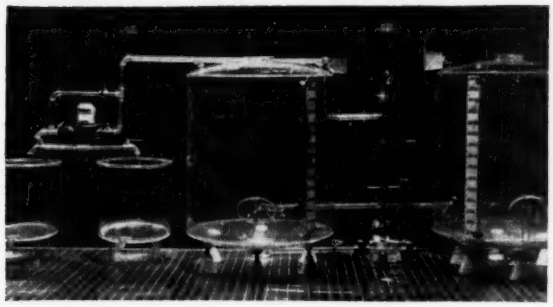
cases, cut, fold and stack them in an uncut empty case. These bulky packages were then removed from the production area.

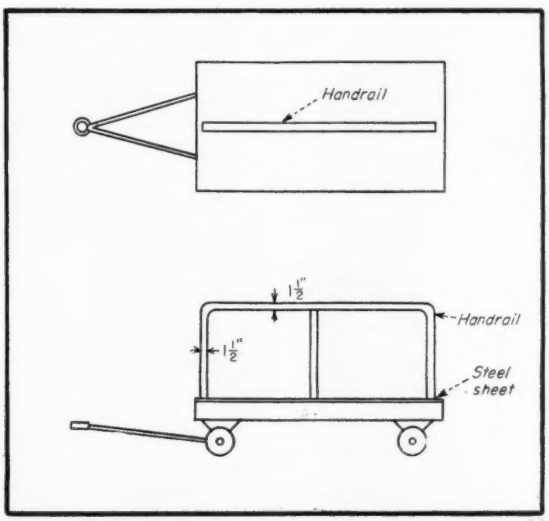
Now, the packaging line worker who empties cartons from their case, tosses the latter into the screen-enclosed frame mounted on a handtruck (see photo). Only one man is now required to remove filled trucks and return empty trucks. What's more, he has ample time to feed discarded cases into a paper baling machine—*Wm J. Scheffer, Plant Manager, Seabrook Farms Co., Bridgeton, N. J.*



Easy-To-Visualize Plastic Model

Through use of a light-weight Plexiglas-scale model, we've been able to simply and easily demonstrate the benefits and operation of a typical system for in-plant handling of liquid sugar to prospective users.

Model consists of two miniature storage tanks, pipes, pump (that actually operates), wire-screen strainer, pressure tank, meter, and two mixing tanks.—*J. N. McLean, Sales Engineer, Refined Syrups & Sugars, Inc., Yonkers, N. Y.*



Plant Tractor Hauls People

When factory offices are at long-walk distance from production areas, to-and-fro trips by management personnel are time-consuming and tiring. And when workers have a long walk from entrance point to work areas they are unhappy about it.

Both of these problems have been solved in one plant by the operation of "chore boys" as passenger carriers. These consist of an industrial power tractor which pulls one or two flat-bed trailers. Each of the trailers is 6 ft. long and 3 ft. wide. Its bed is covered with heavy-gage sheet steel and a waist-high handrail made of 1¼ in. pipe is mounted lengthwise of the trailer, along the center. This handrail is supported by 1½ in. pipes at the end and in the middle, the supports being welded to the rail and to the steel trailer bed.

Six or eight people can ride each trailer in a standing position, holding to the handrail to avoid falling.

Such passenger conveyances can be operated between two distant points continuously, either during rush hours only, or throughout the work day where there is sufficient personnel traffic.

If used only in rush hours, the tractor-trailers can haul materials and supplies in-between.—*FE Staff.*

$50 Extra for Best Item

You are invited to submit Practical Ideas. You will be paid at regular rates when you item is printed and if it is judged best for the month, you will get an additional payment of $50.

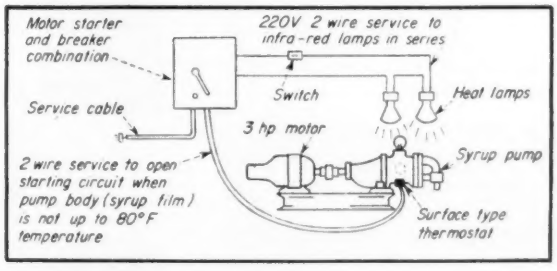
Selection of the best contributed item will be made by a group of 200 readers each month, and the item title and authors name will be cited (see below).

Practical Ideas may describe any type of device or method recently developed to solve a problem, speed an operation, or make some task easier. They may concern factory, laboratory, warehouse, or power-plant operations in the food industry. Ideas on management, maintenance, and trucking or shipping also are suitable.

You need not be an experienced writer or draftsman to submit these ideas. The text will be edited and sketches converted to finished drawings.

Send your items to: Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.

MARCH PRACTICAL IDEA winner was "Builds Own Case Sealer," submitted by President Edwin Mason, Production Manager Jim Weber, and Engineer D. S. Medrick of Mason-Keller Corp., Roseland, N. J. Described was a plant-fabricated case-sealer built on a roller conveyor with upright Masonite-lined boards and chrome-plated guides.


Motor starter and breaker combination
220V 2 wire service to infra-red lamps in series
Switch
Heat lamps
Service cable
3 hp motor
Syrup pump
2 wire service to open starting circuit when pump body (syrup film) is not up to 80°F temperature
Surface type thermostat

Pump Protection Assured

Prevention of damage to a motor and pump assembly was made certain at A. E. Staley Mfg. Co., Decatur, Ill. when two control measures were installed.

Here outlined is the source of damage and how pump assembly injury was avoided. (*Turn page*)

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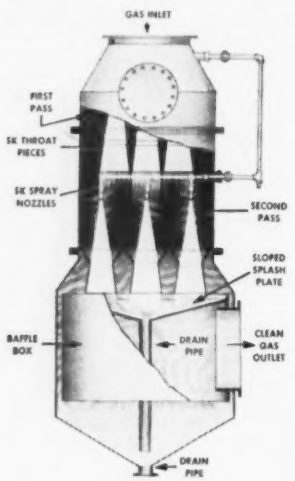
PIPE APPARATUS • HEAT TRANSFER EQUIPMENT • STRAINERS • CONDENSERS AND VACUUM PUMPS • OIL BURNING EQUIPMENT •

HERE'S HELP IN SCRUBBING GASES OR FUMES

SK Gas and Fume Scrubbers are being widely applied in the Food Process Industry to scrub and remove obnoxious odors. These scrubbers will handle and clean fumes containing wettable solids and condensable gases and gases which can be cleaned by obtaining a chemical reaction between the gas and selected spray liquids. They have a high scrubbing efficiency rating and require very little maintenance.



The SK Fig. 4010 Fume Scrubber at right is installed in the plant of The Frito Company, manufacturers of Fritos, popular corn chips. This Fume Scrubber is used to collect and eliminate cooking vapors from the cooking tanks. Other such scrubbers are being used in meat packing and rendering and other food processing plants.

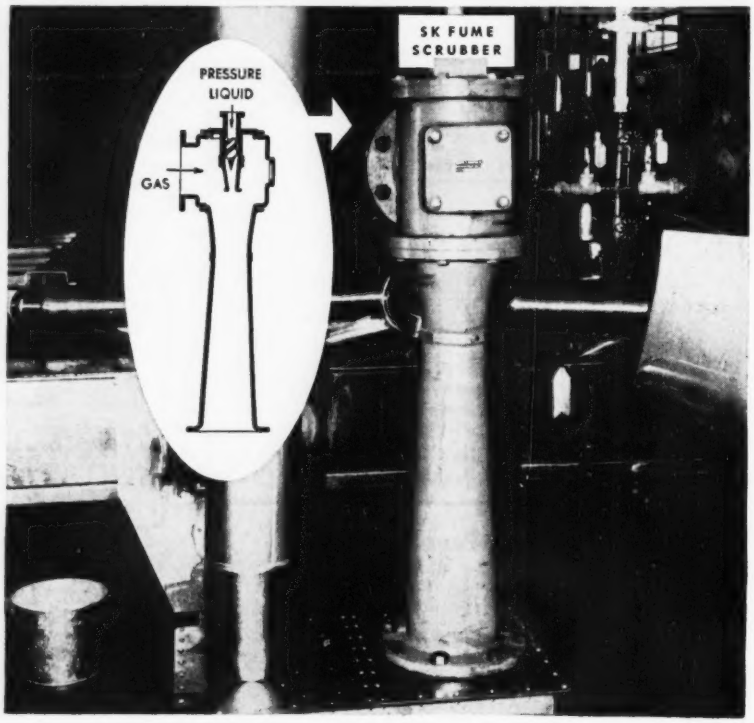
Several types are manufactured by SK. Two are shown—the Fig. 4010 and the Fig. 4031 Fume and Gas Scrubbers.

In the Fig. 4010, the pressure liquid (the operating medium) issuing at the top through a spray nozzle creates a draft thereby entraining the gases and, by contact and mixing in the venturi of the scrubber, absorbs the objectionable elements. Discharge is made into a tank separator wherein the liquid is separated from the cleaned gas.

The Fig. 4031 Scrubber, illustrated, is a packaged unit which can be arranged for vertical down-flow or for horizontal operation. This unit uses SK Fig. 622 Spray Nozzles and SK Throat Pieces arranged in banks as shown. It can be constructed with as many banks (or passes) as necessary although two are usually enough for most operations. This unit provides maximum contact between the spray liquid and the gas. It has an integral separating unit for separating the spray liquid after scrubbing and it is so designed that foam surge will not choke the unit.

As illustrated in Fig. 4031, gas is drawn into the throat pieces by the suction action of the spray thus eliminating any by-passing of gas. The liquid and gas are thoroughly mixed in the throat pieces and are discharged. Throat pieces are staggered from pass to pass to accentuate turbulence within the unit. A splash plate and baffle arrangement separates the liquid from the gas. Liquid falls to the bottom of the unit and drains from it during operation. The gas is discharged through the clean gas outlet.

Complete details on these and other types of SK Fume and Gas Scrubbers are available in Bulletins 4-R and 4-RA. For copies, write to SK at the address below.



SCHUTTE and KOERTING Company
Manufacturing Engineers
[illegible] STATE ROAD
CORNWELLS HEIGHTS
BUCKS COUNTY, PA.
Representatives in Principal Cities

Since the pump handles highly viscous corn syrup, it is necessary that pump temperature be maintained at 90 deg. F. or higher. Otherwise the drive mechanism will be tremendously overloaded, resulting in injury to either pump or motor.

Ordinarily if the syrup and pump were cooled, thereby subjecting the motor to excess load, the combination motor starter and breaker would kick out. It is possible, however, for an operator to hold the circuit breaker handle deliberately on the "on" position in an attempt to pump syrup when too viscous, say at 50 deg. F. At this temperature, the 3 hp. motor driving the pump would be subjected to a theoretical 20 hp. load. When this circumstance occurred something had to give and it usually did. The resulting damage was costly.

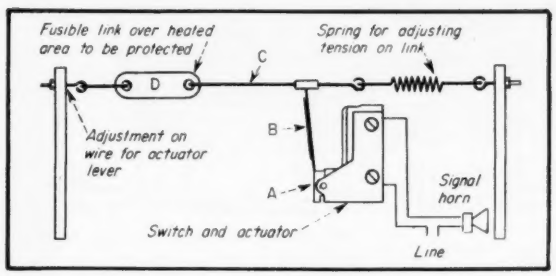
Cooling of the pump was prevented by installing a pair of 220 volt infra-red lamps wired in series and located directly over the syrup pump. Thus the necessary heat was provided to raise the pump temperature to a safe operating zone.

In order to assure that the pump is not operated when the temperature is too low, a surface-type thermostat was mounted on the body of the pump located underneath where it is out of the direct rays from the infra-red heat lamps.

Thermostat is connected to the starter to hold open the starting circuit when the pump body is not up to 80 deg. F. temperature. Thus not only will the pump motor not start if the pump and syrup are not up to temperature, but the motor will shut down automatically if the lights should be shut off or if the temperature of the syrup should drop below the 80 deg. required for pumping safety.

If another thermostat is located beside the first to turn off the infra-red lamps at any time the 80 deg. temperature is exceeded, a realized economy of heating is accomplished.

The first thermostat guarantees that the pump does not operate under adverse conditions, while the second limits heat application to the minimum required, a particularly important economy during the hot summer months.—*Minneapolis-Honeywell Regulator Co., Philadelphia 44.*



Premature Sprinkler Action Avoided

A simple control device warns when the heat above ovens and normally hot areas in a plant approaches the temperature which will set off the sprinkler system.

Thus avoided is damage to equipment and a messy, costly clean-up job, without sacrificing the protection provided by the automatic sprinkling system.

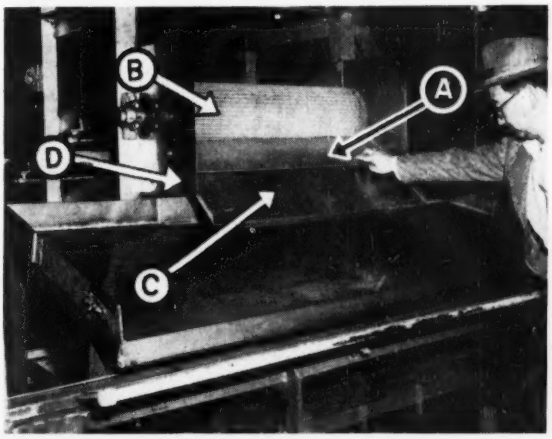
Here's how a control is constructed and how it functions.

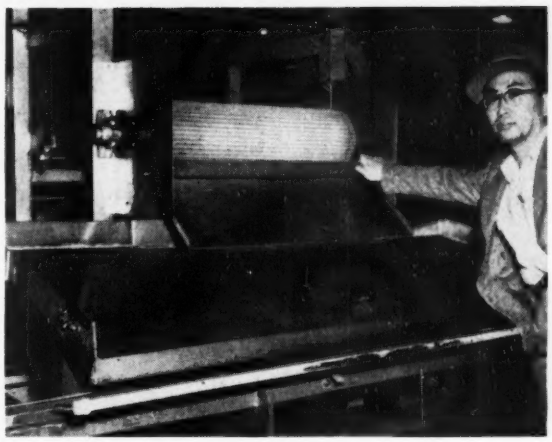
A microswitch—(A) in sketch—is installed above the heat-producing area. A switch in the normally off-position is connected to a signal horn, which is sounded when the microswitch is actuated.

The trip arm (B) of the switch is attached to a spring-operated wire (C) which is held in stationary position by a fusible link (D).

There is no difference between the fusible links installed in the microswitch actuating line and those on the sprinkler head, except that the former are selected with a fusible temperature of approximately 10% less than is required to melt those on the sprinklers.

In order to hold the microswitch operating wire in the proper position, a take-up device is provided for adjustment of the wire.—*Micro Switch, First Industrial Corp., Freeport, Ill.*





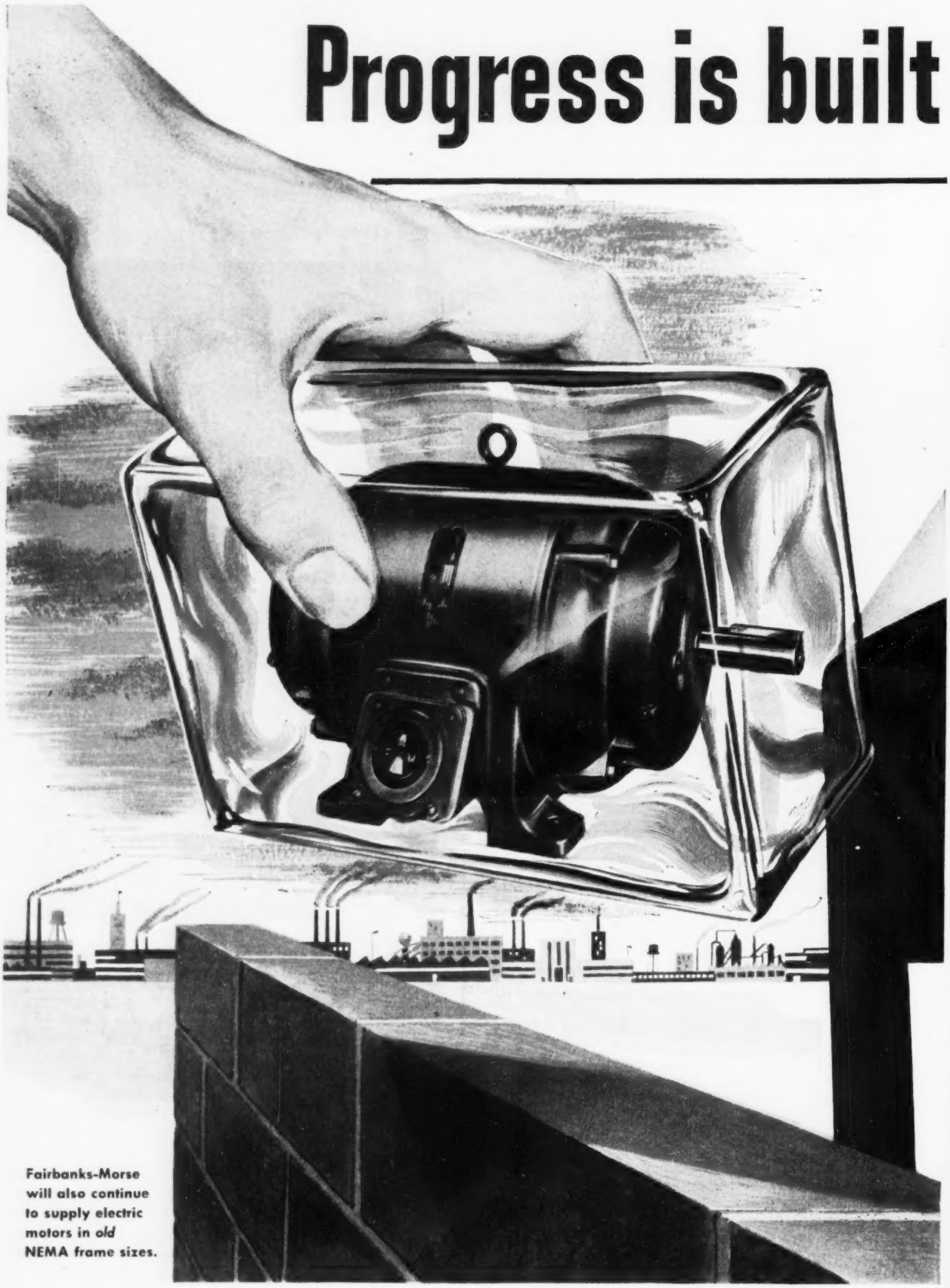
Controls Conveyor Discharge

Installation of an easily fabricated stainless steel plate, pivoted beneath the discharge end of a packaging station feed conveyor, has ended piling up of surplus French fried potatoes whenever the packaging line comes to a complete halt.

Plate—(A) in top photo—is pivoted at a point immediately above the wedge-shaped junction of two chutes located beneath the discharge end of a feed conveyor (B). One chute (C) discharges onto package filling station, the other (D) diverts product to tote boxes located on a roller conveyor beneath the feed conveyor at the packaging station.

When plate is in position shown in top photo, potatoes are fed to the package-filling table. When in the position shown in lower photo, product is filled into tote boxes for temporary accumulation.—*Keigo Inouye, Chief Draftsman, Seabrook Farms Co., Bridgeton, N. J.*

Progress is built



Fairbanks-Morse will also continue to supply electric motors in *old* NEMA frame sizes.

For more information, use coupon on page 177.

...brick by brick

The new NEMA Standard for electric motors is a significant sign of progress to all industry—More Power in Less Space.

But progress—to be lasting—must be built brick by brick
For more than a century, Fairbanks-Morse designers have held to the ideal of more performance in less space. They have produced outstanding advancements in the design of diesel engines, pumps, scales, locomotives and the many other products that feature F-M exclusives. Fairbanks-Morse electric motors built on this basic F-M engineering philosophy are continuing assurance of operating economy and efficiency.

Look for the electric motor that stands on this Fairbanks-Morse solid foundation of design progress. It carries the Fairbanks-Morse Seal of Quality.

NEW FAIRBANKS-MORSE GUARDED DRIPPROOF MOTORS

1 Guarded, dripproof construction keeps falling objects and dripping liquids out of motor in any mounting position—maximum motor protection under conditions of wet or dirty operation—indoors or out.

2 Exclusive Fairbanks-Morse feature that provides a virtually indestructible one-piece rotor—homogeneous, free from flaws and gas inclusion for maximum strength and lifetime service.

3 Oversized, precision ball bearings in spacious housings, sealed against grease leakage. Contain ample lubrication for extended periods of rugged service. Convenient flushing and re-lubricating available if desired.

4 F-M exclusive design eliminates hot spots. Cooling outside air is drawn into motor through openings in lower portion of both bearing arms and circulated through cored passages in the frame.

5 New, gasketed, cast iron conduit box permits easy pulling of cables without insulation damage. Fairbanks-Morse exclusive: recess feature allows elimination of conduit box where space is limited.

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a name worth remembering when you want the best

ELECTRIC MOTORS AND GENERATORS • DIESEL LOCOMOTIVES AND ENGINES • PUMPS • SCALES • RAIL CARS • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

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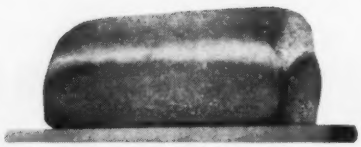

To the man

who doesn't use

Myvatex Food Emulsifier

in his bread

Here are the answers to some questions you may have about Myvatex.

Do you think it costs too much? It doesn't. Not when you consider how much less Myvatex you need compared with usual mono- and diglyceride mixtures. And how its consistent, dependable performance lets you standardize on the most profitable bread production procedures. And how it can always be counted on to help produce good absorption. And how it is quicker and easier to handle, requiring no melting or making a water dispersion before using.

Are you in doubt about how Myvatex will affect your bread? Then you owe it to yourself to see what Myvatex can do . . . how it can improve tenderness, volume, grain, and crumb structure of your bread. And how it has no undesirable effect on flavor or aroma—lets bread smell and taste the way it should. And how it makes the kind of bread that moves off dealers' shelves.

Do you wonder if it will change your shop practices? It won't. With Myvatex there's no need to change mixing time, no need to change any of your operations. You can add Myvatex to either sponge mix or dough.

Are you curious about how Myvatex will affect your production rate? Actually, Myvatex helps speed bread production several ways. It produces a sponge that's easier to work, leaves the mixing machine clean and fast. Less proofing time is needed for the rise you want. The dough machines better, has a smoother skin for molding. And, you can use higher oven temperatures for a firm crust while still keeping the inside soft.

Do you wonder what Myvatex is? Myvatex Food Emulsifier is a 50-50 mixture of prime steam lard and a concentrated monoglyceride produced by our unique molecular distillation process. It is this purification that is largely responsible for the uniform effectiveness of Myvatex in bread, rolls, and yeast-raised sweet goods.

Would you like to try Myvatex? Then write for a free sample. Just tell us how much you need for a fair shop trial and we'll ship it right out. *Distillation Products Industries,* Rochester 3, N. Y. Sales offices: New York and Chicago • W. M. Gillies and Company, Los Angeles and San Francisco • Charles Albert Smith Limited, Montreal and Toronto.

"Myvatex" is a trade-mark.

distillers of monoglycerides made from natural fats and oils

DPi

Also...vitamins A and E

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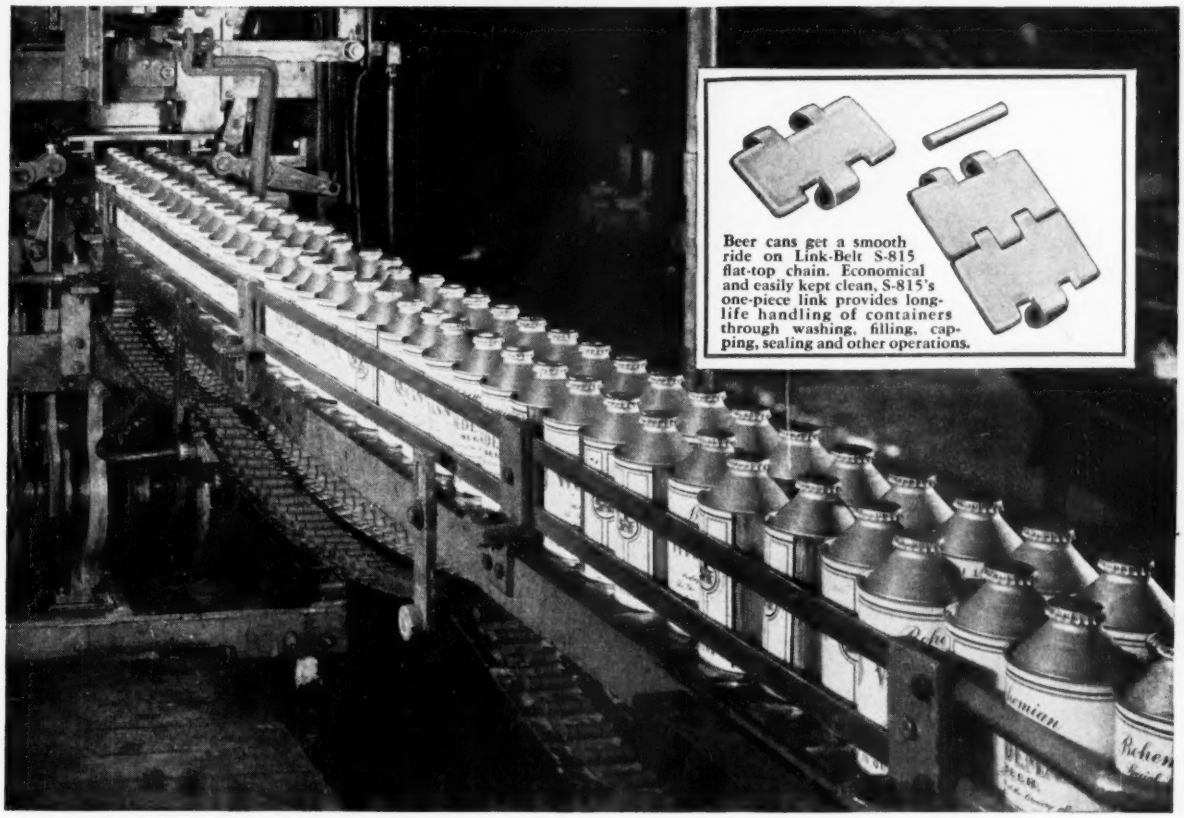


Beer cans get a smooth ride on Link-Belt S-815 flat-top chain. Economical and easily kept clean, S-815's one-piece link provides long-life handling of containers through washing, filling, capping, sealing and other operations.

Here's a smooth-operating, flat-top conveyor chain... moderately priced

LINK-BELT offers the chain that's best for every job

THE many varied drive and conveying jobs performed by chains and sprockets require different physical characteristics. The S-815 flat-top conveyor chain is an example of how Link-Belt builds a type and size for every purpose.

In addition, every chain in the complete Link-Belt line is built for longer life. Rigid control of raw materials and manufacturing processes is your assurance of uniformity.

For all the facts on S-815 flat-top conveyor chain, ask for Folder 2344. And for information on the complete Link-Belt chain line, see your nearest Link-Belt district sales representative.

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle; Scarboro, Toronto and Elmira, Ont. (Canada); Springs (South Africa); Sydney (Australia). Sales Offices in Principal Cities.

LINK-BELT

CHAINS AND SPROCKETS

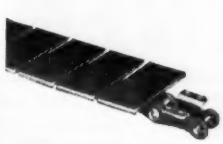
13,325

No one chain serves every purpose... get the RIGHT one from Link-Belt's complete line

Class RC crescent flat-top chain—travels in horizontal planes, around corners; ideal for bottles and cans.

Malleable roller chain for conveyors or inclined elevators where reduced chain pull is desired.

Class 400 swivel chain—carries cartons, cases, etc. over paths with both vertical and horizontal turns.



Class RC flat-top chain—precision made for smoothest, spill-free carrying and long life.

Class RC universal crescent flat-top chain can be used for multiplane operation traveling variety of paths.

For more information, use coupon on page 177.

AUTHENTICATED

CASE HISTORY

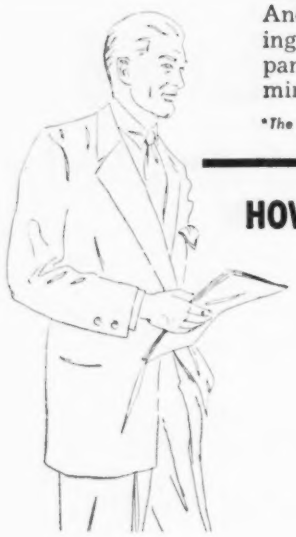
From the current files of the Hoerner Corporation

Re: Cooper Manufacturing Company

HANDLING COSTS REDUCED WAREHOUSING SPACE SAVED*

The Cooper Manufacturing Co., of Marshalltown, Iowa, is famous for its "Cooper Klipper" and "Cyclo-Mo" power mowers — "Gaskoid," "Ferrobes" and "Korkite" gaskets. And for 15 years Hoerner Packaging Engineers have helped the company keep its packaging costs to a minimum with maximum protection for the contents — from mowers to gaskets. But in addition to savings in package design, Hoerner's and Cooper's have worked closely together to save warehousing space and handling costs through pin-point delivery of boxes dove-tailed with production.

*The Hoerner Packaging Engineer responsible: F. C. Supinger



HOW A HOERNER PACKAGING ENGINEER CAN HELP YOU!

If your company packages things, whatever they are, why not ask us to have a Hoerner Packaging Engineer come in and make an objective study of your packaging operations. It won't cost you a cent or obligate you in any way. It can mean an increased margin of profit through savings in labor and material costs, prevention of shipping losses. Just write to one of the Hoerner plants listed below.

SALES OFFICES: 209 S. LaSalle St., Chicago 4
50 E. 42nd St., New York 17

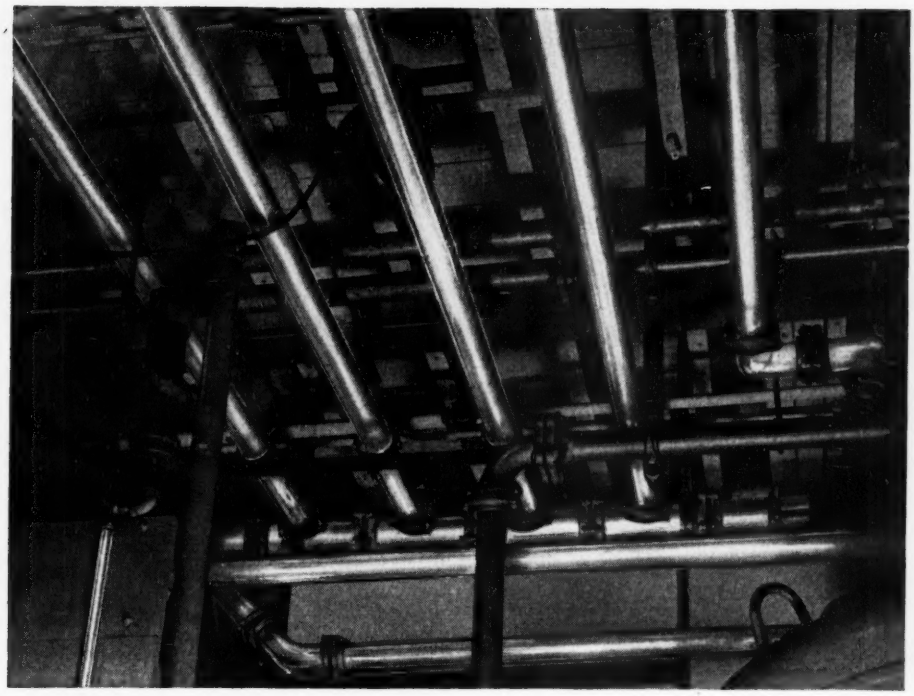
HOERNER BOXES, INC.

GENERAL OFFICE: 600 Morgan Street
Keokuk, Iowa

AFFILIATES—Keokuk, Des Moines and Ottumwa, Iowa
Sand Springs, Oklahoma; Minneapolis, Minnesota
Fort Worth, Texas; Sioux Falls, South Dakota
Fort Smith and Little Rock, Arkansas

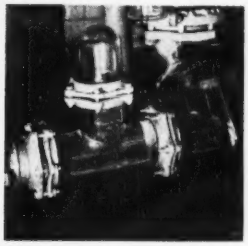
Packaging Engineers Designers and manufacturers of corrugated boxes.

For more information, use coupon on page 177.



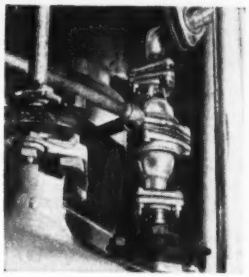
Vinegar and salt solutions can be highly corrosive—and corrosion can affect sanitation. But this PYREX pipe manifold system transporting mustard and other condiments from mill manufacturing to glass-lined storage tanks will never corrode. Never will it need replacement. Connection with tanks and pipes of other materials is simple.

Close-up of the PYREX outlet pipe of a storage tank from which foods are pumped to filling stations. The vertical capped-end pipe is a flush-out line. Another important PYREX pipe feature: It's easy to clean in place. Note, too, that the pipe is transparent. You can check cleanliness or pipe contents at any time at any point. ▼



The unique check valve shown below is made of PYREX brand glass pipe reducers.

You can obtain stock fittings and adapters to meet any installation requirement. The entire R. T. French installation was made by factory maintenance men. ▼



How R. T. French achieves pipeline sanitation

Even the slightest amount of pipeline corrosion can seriously impair a food processor's effort to maintain high sanitation standards.

To eliminate corrosion as a sanitation threat and to reduce pipeline maintenance and replacement, the R. T. French Company, well-known Rochester, N. Y., maker of mustards and sauces, installed PYREX brand "Double-Tough" glass pipe.

The company reports that PYREX pipe has ended the threat of pipeline contamination. It is easy to clean in place and does not corrode. Chemically stable, it is unaffected by all acids, except hydrofluoric.

Helps guard flavor

Delicately flavored foods are perfectly safe in easy-to-clean glass. PYREX pipe cannot affect the taste, color or purity of anything it contains.

Savings for you

PYREX pipe can save you money whenever you have a line corrosion or contamination problem. It ends expensive replacement of corroded lines. It is actually the lowest cost non-corrosive pipe you can use. Installation is inexpensive too. And it costs less to clean. It needs practically no maintenance.

How about your plant?

You spend nothing to investigate the uses of PYREX pipe. Your nearest Corning Distributor will gladly discuss your problem and ways PYREX pipe may help. His name is listed below. Write, wire or phone him for prompt attention. Or send the coupon for free detailed literature.

DISTRIBUTOR LIST:

BELMONT, CALIFORNIA
Glass Engineering Laboratories
FRESNO 17, CALIFORNIA
Valley Foundry & Machine Works
NEW HAVEN, CONNECTICUT
Macalaster Bicknell Company
ATLANTA, GEORGIA
Southern Scientific Company
CHICAGO 44, ILLINOIS
Fred S. Hickey, Inc.
NEW ORLEANS, LOUISIANA
W. H. Curtin & Company
CAMBRIDGE 39, MASS.
Macalaster Bicknell Company
ST. LOUIS 4, MISSOURI
Stemmerich Supply Inc.
LODI, NEW JERSEY
Mooney Brothers Corporation
ALBANY 5, NEW YORK
A. J. Eckert Industrial Sales Corp.
BUFFALO 13, NEW YORK
Buffalo Apparatus Co.
ROCHESTER 3, NEW YORK
Will Corporation
HATBORO, PA.
Sentinel Glass Company
PITTSBURGH 19, PA.
Fisher Scientific Company
HOUSTON 7, TEXAS
W. H. Curtin & Company
SEATTLE 4, WASHINGTON
Scientific Supplies
MONTREAL 3, QUEBEC, CAN.
Fisher Scientific Company, Ltd.
TORONTO, ONTARIO, CAN.
Fisher Scientific Company, Ltd.
VANCOUVER, B. C., CAN. Scientific Supplies

Corning means research in Glass

CORNING GLASS WORKS

55 CRYSTAL ST., CORNING, N. Y.

Please send me the material checked below:

- ☐ "PYREX brand 'Double-Tough' Glass Pipe and Fittings Catalog" (EA-3)
- ☐ "PYREX brand Glass Pipe in the Process Industries" (EA-1)
- ☐ Please have a PYREX pipe representative call

Name ..... Title .....

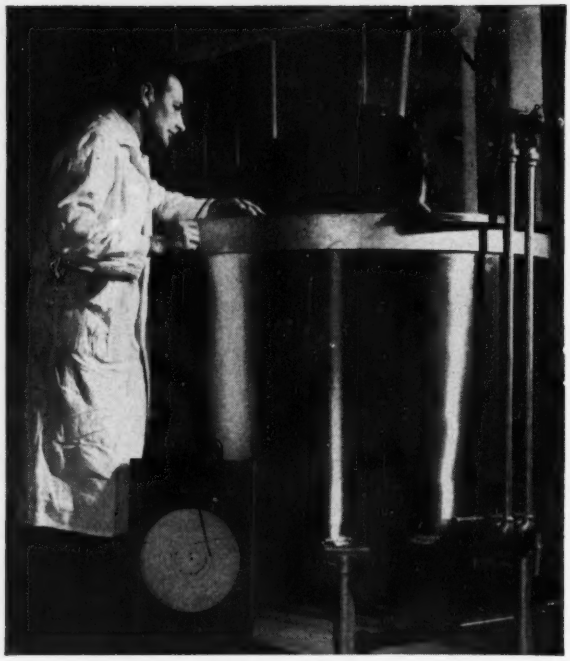
Company .....

Address .....

City ..... Zone ..... State .....

For more information, use coupon on page 177.

CONSTANT SYRUP CONSISTENCY *facilitates handling of raw materials, regardless of outdoor temperature. Steam coils in the tank car heat the received syrup, and a Brown thermometer automatically shuts off steam when proper temperature is reached.*



SPOT CHECKS *of marshmallow cooking kettles are easily made, by means of a portable Brown thermometer. The operator simply immerses the thermometer bulb in the kettle, allows a few seconds for the instrument to record temperature, and moves on to the next process.*

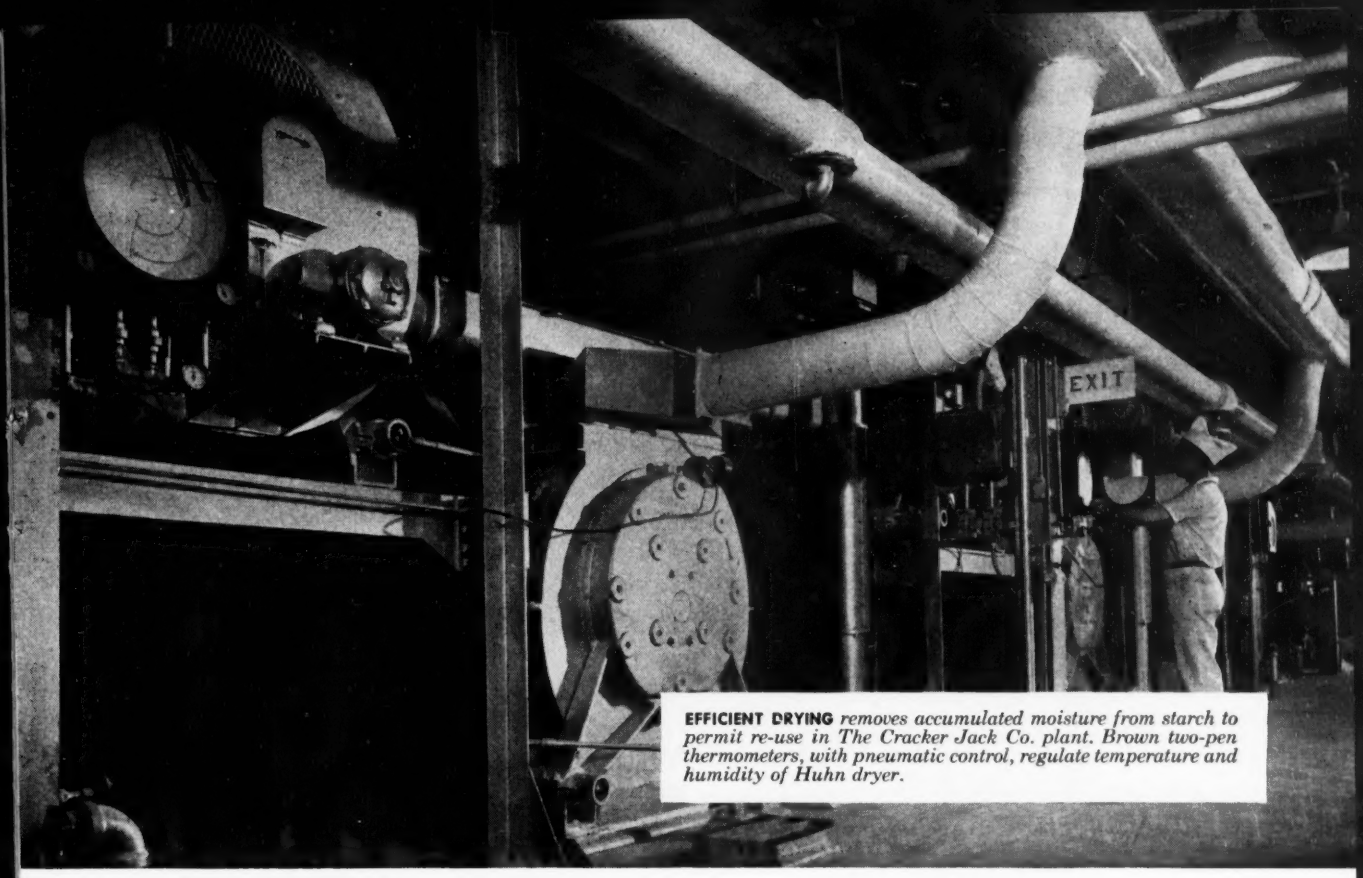
Critical temperatures *controlled by*

The inside story of Brown Thermometers

Thermometers use one of the best-known effects of heat—the expansion of a fluid. From this basic principle, an extensive family of Brown thermometers has developed. Especially valuable in the temperature range from —125 to +1000° F, these instruments have a thermal system consisting of a bulb connected by capillary tubing to a spiral. When temperature changes at the bulb, the fluid within it tends to expand or contract. The resulting changes in pressure in the sealed system cause the measuring spiral to wind or unwind, and thus to move the pen, pointer or control mechanism.

There are three basic types of thermal systems: mercury, gas and vapor-pressure. Mercury-filled systems are useful at higher temperatures. Gas-filled systems are most suitable for very low temperatures. Vapor-pressure systems, which contain both a volatile liquid and its vapor, are often recommended for narrow ranges. Various types of temperature compensation are built into the instrument, to eliminate the effects of changes in ambient temperature at the instrument, and changes in temperature along the capillary.

Because of their simple construction, Brown thermometers operate with an absolute minimum of routine attention. A wide selection of bulbs and fittings is available, including a wide range of types especially designed for the sanitary requirements of food processing.



EFFICIENT DRYING *removes accumulated moisture from starch to permit re-use in The Cracker Jack Co. plant. Brown two-pen thermometers, with pneumatic control, regulate temperature and humidity of Huhn dryer.*

in confectionery plant *versatile Brown thermometers*

AT SEVERAL different stages in the production of "Campfire" marshmallows, at The Cracker Jack Co. of Chicago, Brown thermometers measure and control temperatures essential to plant efficiency and product quality. They regulate the heating of syrup in tank cars . . . check the operation of cooking kettles . . . control drying of starch.

Practically any process that needs good temperature control can benefit by the use of Brown thermometers. Proved by years of usage throughout the food industry, these simple, rugged instruments afford features of precision, low maintenance and thoroughly dependable operation. They are available in many varied models: integral bulb, remote bulb, remote transmitters and receivers . . . with thermal systems that cover nearly every food processing application. Control systems include an extensive choice of electric and pneumatic forms . . . two-position, proportional, proportional-plus-reset, and fully automatic program control. The selection also covers multiple-pen instruments which combine related records of temperature, pressure and flow on a single chart.

From this wide line, Honeywell engineers with extensive experience in food process control can design thermometer instrumentation that exactly fits the requirements of your process. For a discussion of your specific application, call your nearby Honeywell sales engineer today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

● **REFERENCE DATA:** Write for Catalog 6709, "Remote Bulb Thermometers."

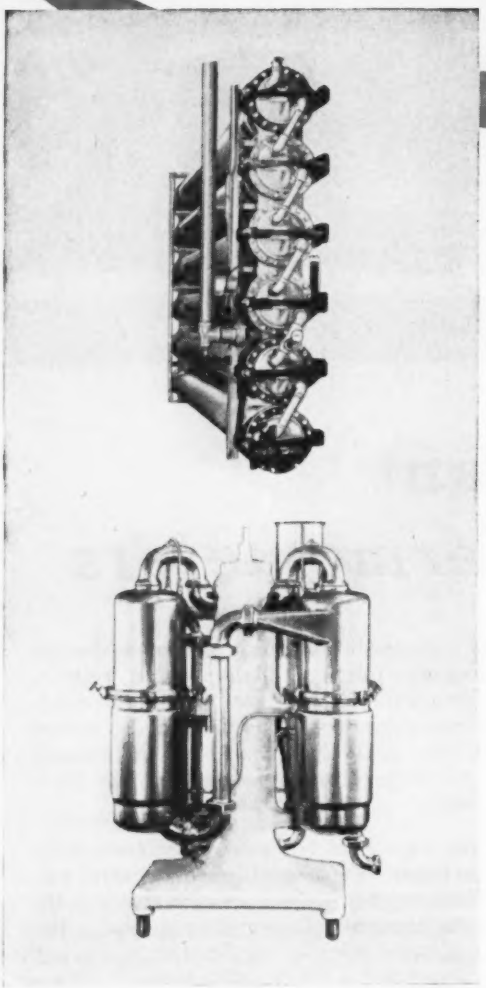
MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

First in Controls

Beer or Butter

—Better Your Products and Profits with *Carpenter* Stainless Tubing



Whether you use multiple-stage heat exchangers for fast cooling of brews—or flash pasteurizer-evaporators for the production of better butter; whether you cook, pump, cool or can foods or food products of any kind, there is a story worth thinking about in the equipment pictured at the left.

It's a simple story—"There's a difference in stainless tubing, and Carpenter makes the best of it". It's a difference that's measurable in adherence to rigid standards of analysis, dimension, finish, tolerance, concentricity, ductility.

What this difference means to you is simple, too. It means longer life for equipment, easier cleaning, lower maintenance costs, and, in the event repairs are needed, lower working and fabrication costs.

For your own tubing needs take advantage of the difference. Order your next stainless tubing from your Carpenter Distributor—he'll also give you any engineering or design assistance you may need. When you call Carpenter, "One Call Does It All".

The Carpenter Steel Company, Alloy Tube Division, Union, N.J.
Branch Offices: Atlanta Chicago Pittsburgh Houston Newark San Francisco
Export Dept.: The Carpenter Steel Co., Port Washington, N.Y. "CARSTEELCO"

Carpenter

STAINLESS TUBING & PIPE

Analysis → Tolerance → Finish →

- guaranteed on every shipment

For more information, use coupon on page 177.

Electronic spacer patterns guide stockpile through sequence of cuts automatically. Responsive Oilgear Transmission provides speedy travel with pin-point stopping within 3/1000ths of an inch from zero tolerance. Lawson Cutter also used in repetitive single cuts and for trim on sides. Photo in plant of Liedtke Brothers, Chicago.

The RESULT?

Accuracy just 900% better

Production increase 50 to 500%

Over and over and over again, Oilgear Fluid Power proves to be the right solution to a drive problem. Take the case of the Lawson Cutter.

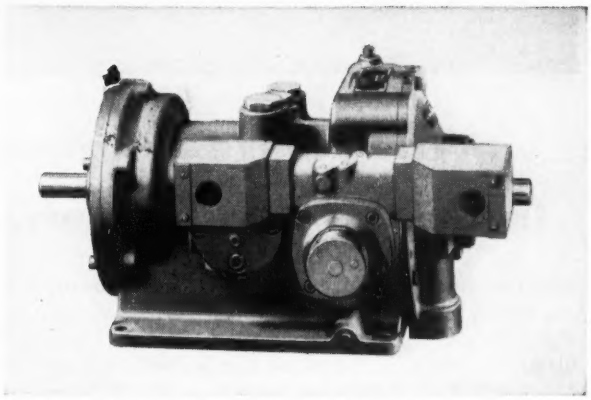
If precision is emphasized anywhere, that "where" is the field of fine color printing of every description. Money, time, effort are spent that art be right, that plates be right, that printing be right—to a hairline. And then comes the cutting operation where all that has gone before is saved—or wasted. Small wonder that cutting remained a hand operation for many years.

But the E. P. Lawson Company, manufacturer of cutting machines, wanted to modernize and mechanize the operation. Its designers turned to an electronic spacer device. This if anything would give precision in marking *where* to cut. But the next problem was to find a power drive capable of *obeying* the orders the electronic signal system was capable of *giving*. Lawson tried one type of drive. It varied all over the map. Lawson tried another type of drive. It was fairly accurate —but did not hold up.

Finally, as so many machine designers have done, Lawson turned to Oilgear. And there, as so many machine designers have done, Lawson found the answer to its problem.

The answer? Undeviating accuracy within 3/1000ths of an inch from zero tolerance—just 900% better than what had been achieved in the past; speed, translating into production increases of 50% to 500% month in and month out. How? Through the absolute responsiveness of Oilgear Fluid Power Drive to the automatic control system. Immediate, shockless acceleration to full speed "forward". Precise measured slowdown as the feed fence nears the target. Precision stopping "on target" for the cut and then rapid acceleration toward the next cut.

Here again is an example of the superlative "rightness" of Oilgear Fluid Power "generators," motors, transmissions—for almost any type of installation or machine requirement, big, little, and all those in between.

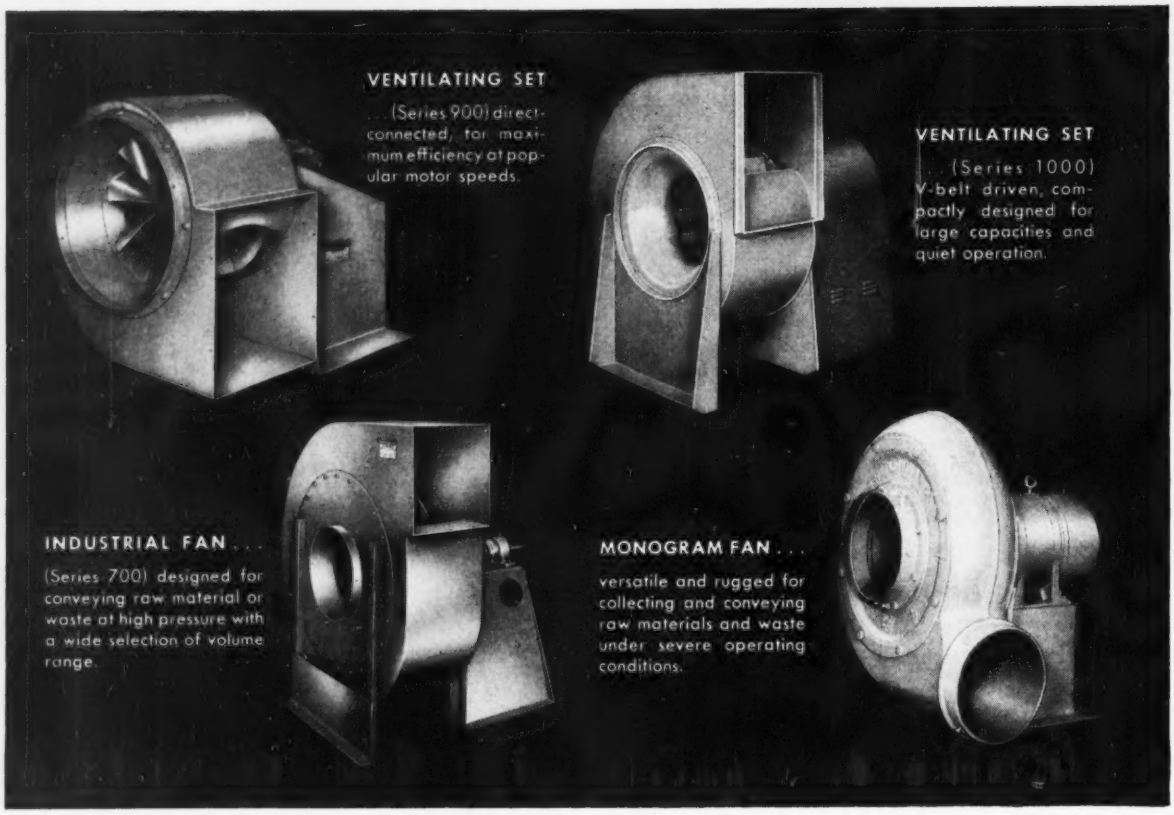


Oilgear Two way Variable Speed Transmission as used on Lawson Electronic Spacer Cutters. These drives also provide unlimited speed range from zero to maximum. Speed changes made in split second or specified time.

Chances are Oilgear is *the* solution you've been looking for. And Oilgear engineers will be just as quick to tell you if Oilgear is *not* for you. Ask for further information from an Oilgear Engineering Representative. No charge. No obligation. THE OILGEAR COMPANY, 1580 W. Pierce St., Milwaukee 4, Wisconsin.

OILGEAR

OILGEAR


VENTILATING SET
. . . (Series 900) direct-connected, for maximum efficiency at popular motor speeds.
VENTILATING SET
. . . (Series 1000) V-belt driven, compactly designed for large capacities and quiet operation.
INDUSTRIAL FAN . . .
(Series 700) designed for conveying raw material or waste at high pressure with a wide selection of volume range.
MONOGRAM FAN . . .
versatile and rugged for collecting and conveying raw materials and waste under severe operating conditions.

These Westinghouse Fans Help You Increase Production...Employee Efficiency

Whatever your air handling problem . . . smoke, fumes, vapor, dust, wood shavings, granular material or ventilating . . . these Westinghouse fans are designed to handle or remove them . . . efficiently and economically.

Monogram and Industrial Fans are designed for collecting and conveying raw materials and waste . . . and permit a wide range of selections to meet the most exacting requirements.

Ventilating Sets are designed for maximum efficiency, quiet operation and low power consumption . . . for years of trouble-free operation.

Each of these rugged, powerful Westinghouse fans will prove to be the most economical solution to your specific air handling problem. And Westinghouse fans offer a *single equipment warranty* with undivided responsibility . . . an *exclusive* Westinghouse-Sturtevant feature. Get the fan built for *your* need from your nearest Westinghouse-Sturtevant office today. Or write: Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Mass.

SERIES 900 VENTILATING SETS

Compact, efficient, direct-connected and ready-to-run. Especially suited for small ventilating installations. Radial blade wheel design minimizes problem of airborne dirt and grease. Designed for volumes to 3200 cfm.

SERIES 1000 VENTILATING SETS

V-belt driven, self-contained. Adaptable to either indoor or outdoor installations for a wide variety of heating, ventilating or air conditioning applications. Designed for volumes to 14,000 cfm. Available in sizes from 9" to 30" wheel diameters.

INDUSTRIAL FANS (SERIES 700)

Permits a wide range of volume selections at high pressure for handling and conveying raw material and waste.

MONOGRAM FAN

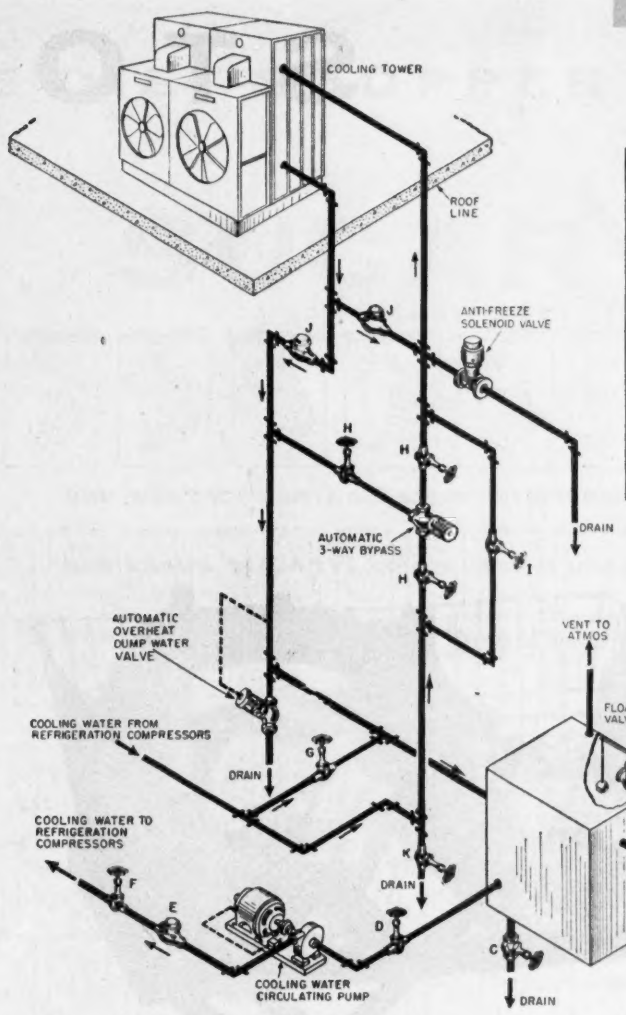
Ruggedly built, many-purpose fans for use either as a blower or exhauster for dust control, collecting and conveying waste or raw materials, and supplying air for furnace blast, drying, etc. Provides long, trouble-free service at low cost under severest operating conditions. Available in ten sizes with capacities from 200 to 13,500 cfm . . . pressures from 1" to 12" wg.

WESTINGHOUSE AIR HANDLING

J-80380

YOU CAN BE SURE ... IF IT'S Westinghouse

JENKINS PRACTICAL PIPING LAYOUTS 71



VALVE RECOMMENDATIONS
For details of valves to suit varying conditions, see Jenkins Catalog.

Code	Quan.	JENKINS VALVE	SERVICE
A	2	Fig. 106-A Bronze Globe	City Water Control
B	1	Fig. 92 Bronze Swing Check	Prevent Backflow into City Water
C	1	Fig. 106-A Bronze Globe	Drain for Storage Tank
D	1	Fig. 1243 T.S. Brz. Solder Gate	Shutoff Cooling Water Circulating Pump
E	1	Fig. 1222 Swing Check Sldr.	Prevent Backflow to Pump
F	1	Fig. 1200 Bronze Solder Globe	Pump Discharge Control
G	1	Fig. 1200 Bronze Solder Globe	Cooling Tower Manual ByPass
H	3	Fig. 1243 T.S. Brz. Solder Gate	Auto. 3 Way ByPass Shutoff
I	1	Fig. 1200 Bronze Solder Globe	Manual ByPass for Auto. Valve
J	2	Fig. 1222 Swing Check Solder	Prevent Backflow to Tower
K	1	Fig. 1200 Bronze Solder Globe	Cooling Tower Drain

Diagram by Huxley Madeheim, Consulting Engineer
COPYRIGHT, 1953 — JENKINS BROS.

How to plan PIPING CONNECTIONS *for a* NON-FREEZE COOLING TOWER

Where uninterrupted refrigeration is a round-the-clock operating requirement, a non-freeze cooling tower of the type illustrated here offers a dependable supply of cooling water at low cost. It also conforms with the water conservation regulations now enforced in many localities.

Since cooling tower and compressors must operate on the same schedule in any continuous refrigeration system—even when temperatures are below freezing—the water used in this system is stored in a vented or open tank located in a heated space, rather than in the conventional pan under the exposed tower.

When freezing weather occurs, an anti-freeze solenoid valve, actuated by a temperature-sensitive device, opens to drain all water from lines exposed to outside temperatures. The automatic 3-way solenoid valve permits the water to bypass the cooling tower under freezing conditions, or when it becomes too warm due to fan failure or overload in the storage tank. Under the latter conditions, the automatic overheat dump valve would also open. The subsequent drop of the water level in the storage tank causes the float valve to open and admit city water to make up the deficiency. Thus, in an emergency, city water would be used for cooling.

Consultation with accredited piping engineers and contractors is recommended when planning any major piping installation.

To simplify planning, to save time, to get all the advantages of Jenkins specialized valve engineering experience, select all the valves you need from the complete Jenkins line. It's your best assurance of *lowest cost in the long run.* Jenkins Bros., 100 Park Ave., New York 17.

Complete description and enlarged diagram of this layout free on request. Includes additional detailed information. Simply ask for Piping Layout No. 71.

JENKINS VALVES
LOOK FOR THE DIAMOND MARK
SINCE 1864 TRADE JENKINS MARK
Jenkins Bros

For more information, use coupon on page 177.

THE DIET-SHOPPER WITH

SUCARYL®

(CYCLAMATE, ABBOTT)

She won't (or can't) eat sugar-sweetened foods

She knows SUCARYL, she's used it in her home

She's part of the huge new market for your SUCARYL-sweetened line

36,000,000 overweight and diabetics—that's one out of every four persons. People who want sweet foods without the penalty of added calories. People who will buy—*actually shop for*—your SUCARYL-labeled line.

They'll buy because they're pre-sold. Magazines and newspapers reaching practically every home in the nation did that for you. Home-use of SUCARYL by millions did it, too. Through this wide-spread publicity and actual use, people know SUCARYL gives them what they want: *true, clean, sugar-like sweetness without added calories or tell-tale bitterness.*

To those who act now, while the market is new, busy—growing—the opportunities for a new plus-profit line of business are both plentiful and practical. Your next move? Write today to Chemical Sales Division, Abbott Laboratories, North Chicago, Ill.

Abbott

For more information, use coupon on page 177.

"TIMKEN® bearings contribute to dependable Toledo performance"

... says *Toledo Scale Company*

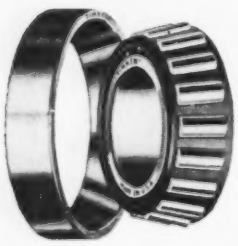
How **TOLEDO SCALE COMPANY** mounts the knife shaft of its Model 5400 slicer on Timken bearings to assure accurate slicing, long life.

BY mounting the knife of the Toledo Model 5400 Slicer on Timken® tapered roller bearings, Toledo engineers have cut service problems to a minimum. Here's why: The tapered construction of Timken bearings enables them to take radial and thrust loads in any combination. Line contact between rollers and races holds the shaft in rigid alignment, prevents wobble. Wear on moving parts is minimized, reducing the risk of breakdown and expensive maintenance.

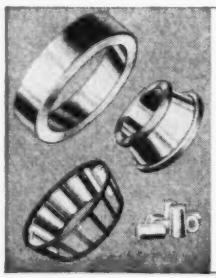
In addition, Timken bearings hold the shafts concentric with the housing, making closures more effective. Dirt and moisture are kept out. Lubricant is kept in, eliminating the possibility of food contamination. A maximum of power is transmitted to the knife because the true rolling motion and incredibly smooth surface finish of Timken bearings practically eliminate friction.

No matter what type of food machinery you buy or build, always specify Timken tapered roller bearings. They give you the most value because they have the most quality. One of the ways we control it is by making our own steel. We're the only bearing manufacturer in the U. S. A. that does. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



TIMKEN®
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



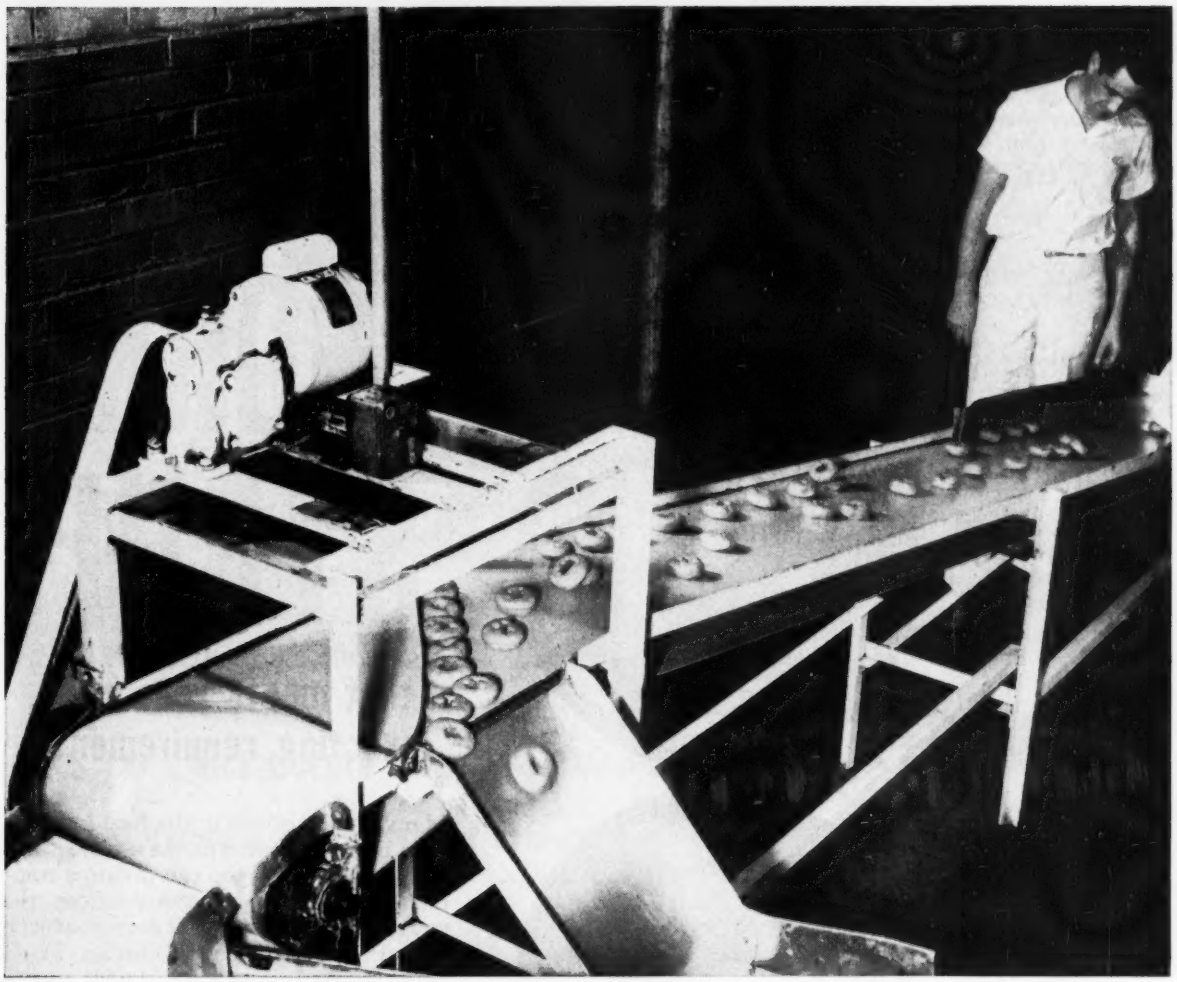
DESIGN LEADERSHIP

The first Timken tapered roller bearing was produced in 1898. Since then the one-piece multiple perforated cage, wide area contact between roller ends and ribs, and every other important tapered roller bearing improvement have been introduced by The Timken Roller Bearing Company.

The Timken Company leads in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis steels.

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◎ AND THRUST ←◎→ LOADS OR ANY COMBINATION

B. F. Goodrich announces



Cooking oils can't harm this belt—it's Koroseal

HERE'S the new Koroseal belt that's making important savings in bakeries, food processing plants and other places where cooking oils, meats, nuts, greasy pans used to shorten the life of canvas, rubber and plastic-coated belts.

Because it's made of Koroseal flexible material, this new B. F. Goodrich belt is not affected by cooking oils, animal fats, most acids—and stands hard use, rough handling, heat, cold, and just about everything else that ruins most materials. Koroseal resists cracking and peeling, doesn't get soft or sticky. It's nontoxic, too, and has no odor or taste to transfer to foods.

The Koroseal belt has a smooth, polished surface. Food particles can't grind into it. That's what makes the belt so easy to clean. Sticky icings, oily foods, most stains come off with a damp cloth. Or you can use detergents and water as often as you wish. Either way, cleaning time is cut in half. And since Koroseal is completely, permanently waterproof, the belt cover never gets damp or soggy, and so can be used right after washing.

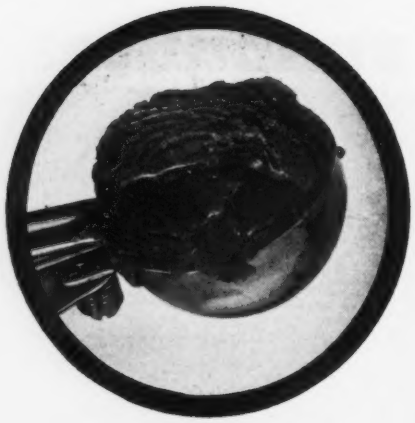
Other new belts, developed by B. F. Goodrich for food handling, include a thin white Koroseal belt for use in cooling tunnels, and two belts, called Highseal and Kleenseal, that are made of new types of rubber compounds. Their "sight-saving" green color reduces glare and eye strain on packaging and inspection lines.

It will pay you to find out more about these work-saving, money-saving improvements in food handling. Have your BFG distributor survey your belting needs and recommend the right B. F. Goodrich belt for your process. If you don't know the distributor nearest you, write us and we'll send his name. *The B. F. Goodrich Company, Dept. M-234, Akron 18, Ohio.*

Koroseal—T. M. Reg. U. S. Pat. Off.

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

For more information, use coupon on page 177.



The new Rex® Brand Corn Syrups were developed to give you quality ice creams at a saving.

You retain the sparkle, color and flavor of pure fruits with Globe and Rex Corn Syrups.

Globe® Brand Corn Syrups are without peer in purity, clarity and in efficiency as a "doctor". Their inverting power is closely controlled.

The uniformity and clarity of Globe Corn Syrups enable you to maintain constant high product standards.

CORN SYRUP

that meets your most exacting requirements

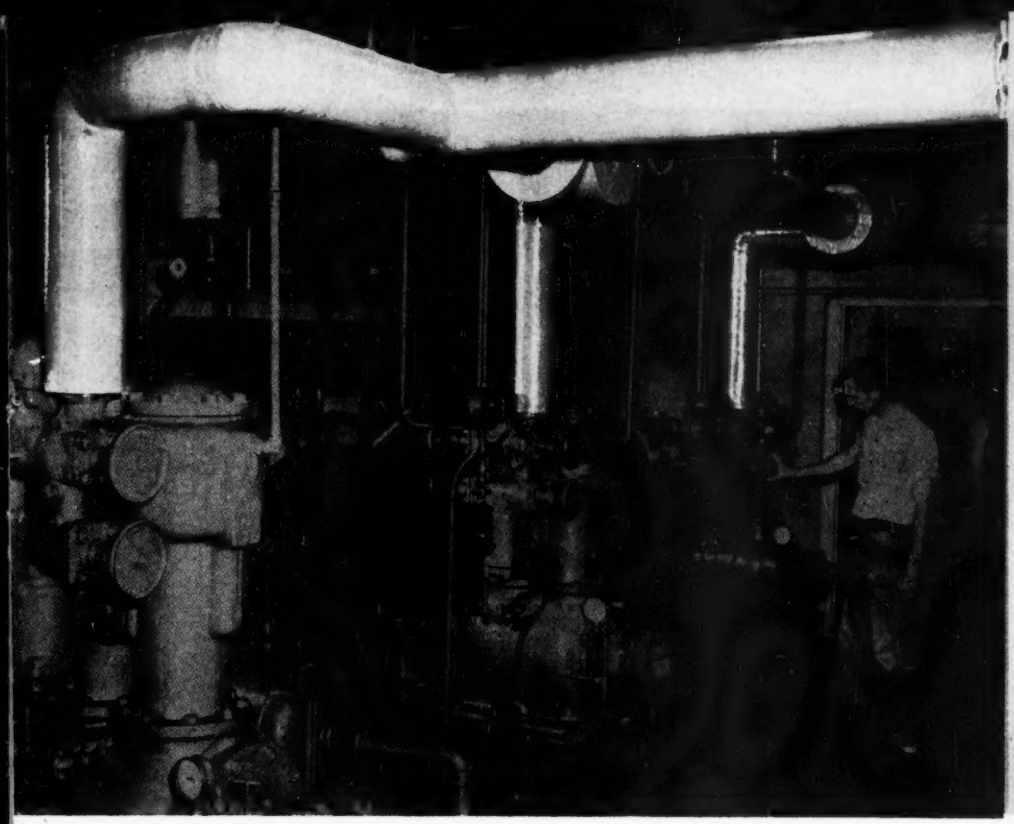
Many new advances in the food industry have been predicated on the use of special corn syrups. Now you can obtain a complete range of corn syrups from the world's prime producer of corn products, Corn Products Refining Company. These corn syrups of superior uniformity, purity and clarity are always available.

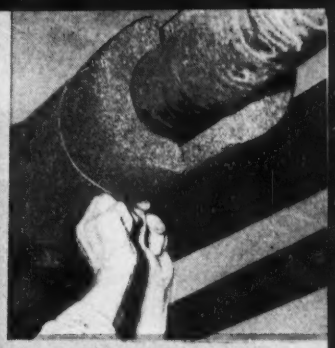
We welcome an opportunity to help you solve current production problems. There is no cost or obligation for this service.

CORN PRODUCTS REFINING COMPANY

17 Battery Place, New York 4, New York

For more information, use coupon on page 177.





Here FOAMGLAS is shown being applied to the piping.

Utility tunnelway in which hundreds of feet of refrigerated tubing are insulated with FOAMGLAS.

LAKE TO LAKE DAIRY reports: "We can salvage FOAMGLAS insulation because it stays dry during piping changes."

Wesley Wise
Production Manager
Lake to Lake Dairy

Wesley Wise, plant production manager of the Lake to Lake Dairy Co-operative, at Kiel, Wisconsin reports: "Because of the continual shifting of equipment due to changing markets in the dairy business, we have the problem of breaking into insulation to make new connections. FOAMGLAS pipe insulation . . . a strong, rigid structure of sealed glass cells . . . can not become watersoaked during such changes.

"On a complete remodeling job, the cloth which covers the piping can be cut along the joints and the FOAMGLAS salvaged for use at another location, re-covered with new cloth, and the insulation made as good as new in effectiveness and appearance. FOAMGLAS' rigidity enables our maintenance crew to apply it and easily obtain a professional looking finish."

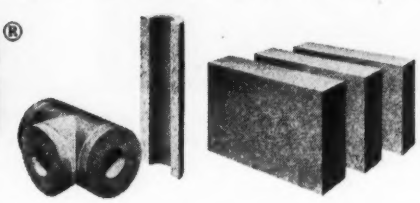
Like the Lake to Lake Dairy Co-operative, you can benefit from the many advantages FOAMGLAS has to offer. Unlike ordinary pipe insulations, FOAMGLAS stays dry, assuring constant life-long insulating performance and avoiding corrosion of piping.

For more information, you should send for our new booklet detailing the use of FOAMGLAS for piping and equipment. Write, to Dept. O-54A. . . .

PITTSBURGH CORNING CORPORATION • One Gateway Center • Pittsburgh 22, Pa.

FOAMGLAS®

the cellular, stay-dry insulation

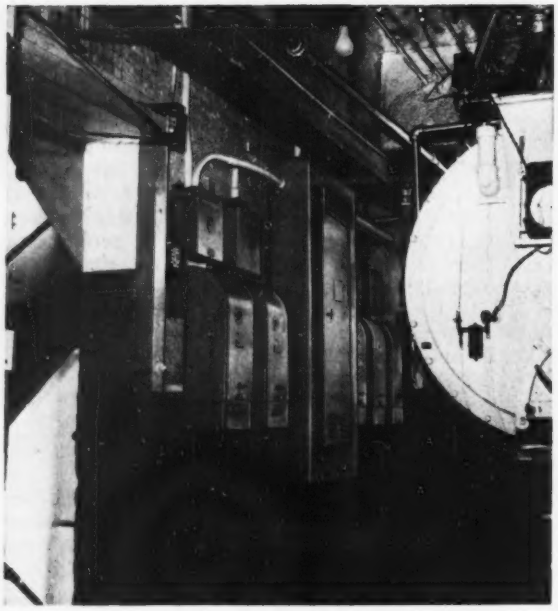


PITTSBURGH PC CORNING

Pittsburgh Corning also makes PC Glass Blocks

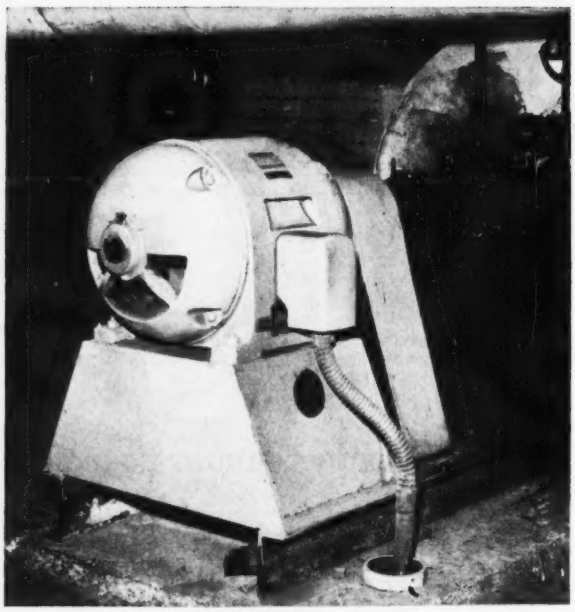
TOUGH, VERSATILE TRI-CLAD* MOTOR can be installed anywhere—will provide top performance and long life even under the most difficult operating conditions. Here the G-E drive is mounted on top of the five-roller refiners at Rockwood's Brooklyn plant. The Tri-Clad motor is controlled through G-E equipment conveniently mounted on rear wall.

Rockwood Chocolate Co. finds G-E drives

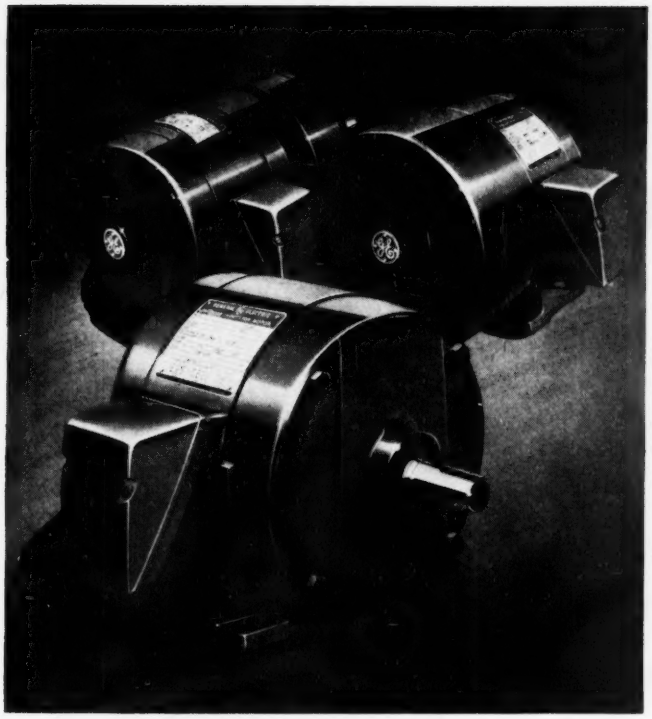


COMPACT G-E CONTROL EQUIPMENT is delivered pretested and factory assembled for easy installation. Operation of these grinders is virtually automatic.

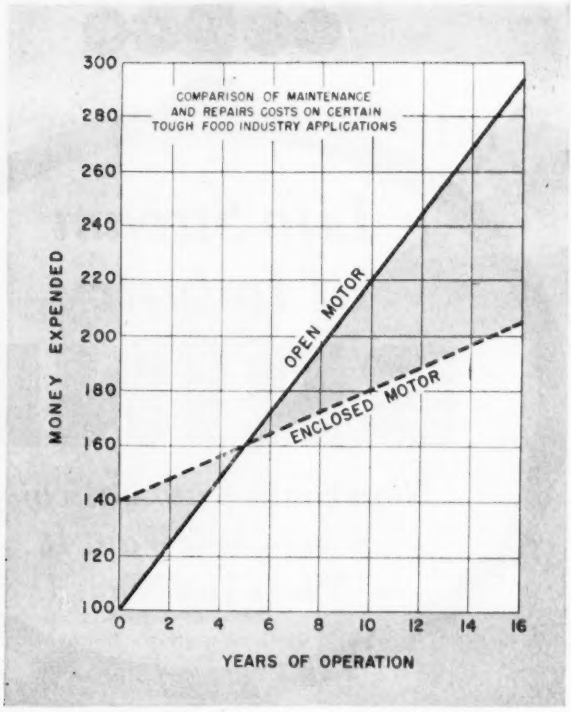
*Reg. Trade mark of General Electric Co.



PROPER MOTOR SELECTION can mean long-term savings. Let G-E engineers show you where the Tri-Clad dripproof motor can do the job or where the enclosed motor should be used.



EVEN LONGER MOTOR LIFE provided by the new Tri-Clad '55' line of gear, dripproof and enclosed motors. A new bearing and grease system greatly reduces maintenance.



YOU SAVE MONEY with the proper motor enclosure. Under tough conditions, in spite of its lower initial cost, an open motor may cost more in the long run than a totally enclosed.

pay off under all operating conditions

"We have experienced long dependable service and low maintenance costs with General Electric drives"—Rockwood Operations Manager

"G-E motors and control are used throughout our plant," says W. E. Ivory, Operations Manager of Rockwood Chocolate Company's big Brooklyn plant, "and we have yet to find an application where they cannot perform the duty." Operating in temperatures ranging from 60° F to 110° F, these G-E drives are giving Rockwood long-term savings.

In Rockwood, as in many food processing plants across the nation, Tri-Clad* motors are giving manufacturers extra years of dependable service. Now, in the first complete redesigning in almost fifteen years, G-E product engineers have developed the new Tri-Clad '55'* motor. This revolutionary motor has all the advantages of the G-E motors installed at Rockwood plus many other significant benefits for the food industry. ***Up to 30% lighter and 50% smaller, the new motor has a greater resistance to moisture and improved bearing lubricants. And its greater efficiency giver you higher full-load speed, less power loss, than other motors.***

G-E application engineers can save you money by helping you select the proper motor enclosure for the specific conditions in your plant. They can determine which of your operations can use open motors, as shown here at Rockwood, and which operations may best be performed by totally-enclosed motors. Although the initial cost of an enclosed motor is slightly higher, its significantly lower maintenance cost may mean long-run economy for you in your tougher applications.

The new Tri-Clad '55' motor is just one of the many electrical components developed by G-E engineers that can prove valuable to you. When planning your next electrical system take advantage of G.E.'s wide experience. Contact your nearest Apparatus Sales Representative or write for Bulletins GEA-6013 on Tri-Clad '55' dripproof or GEA-6012 on Tri-Clad '55' enclosed motors. Section 652-16, General Electric Company, Schenectady 5, New York.

Engineered Electrical Systems for Food Processing Plants

GENERAL ELECTRIC

For more information, use coupon on page 177.

Life Stream of Industry

BRINE

Now Yours Automatically Where You Want It —When You Want It

CANNING

TANNING

WATER SOFTENING

MEAT CURING

DYEING

CHEMICALS

YOUR INDUSTRY, like so many others, very probably uses brine in its operation.

And now the LIXATE Process, pioneered and developed by the International Salt Company, takes all the complications, all the inaccuracies, all the costly handling out of brine making. You use rock salt—and gravity does all the work.

You just turn a valve and *instantly* you have brine where you need it, when you need it—automatically!

And because this pure brine is *always* 100% saturated, because it *always* contains exactly 2.65 pounds of salt per gallon, your brine measurements are *unfailingly* 100% accurate.

Hundreds of companies have saved thousands of dollars, have improved the quality of their products by installing the LIXATE Process. Let International's Industrial Division help *you*. Send the coupon below, today.

INTERNATIONAL SALT COMPANY, INC.
INDUSTRIAL DIVISION, Scranton 2, Pa.

I am interested in knowing what the *Lixate* Process can do for MY plant. Please have an International Industrial Engineer contact me as soon as possible. I understand there is no cost, no obligation.

FIRM NAME_____

ADDRESS_____

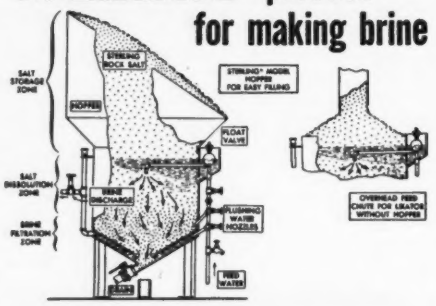
CITY_____ ZONE_____

STATE_____

MY NAME_____

MY TITLE_____

the LIXATE* process for making brine



HOW LIXATOR WORKS

In the dissolution zone—flowing through a bed of Sterling Rock Salt which is continuously replenished by gravity feed, water dissolves salt to form 100% saturated brine. **In the filtration zone**—through use of the *self-filtration* principle *originated by International Salt Company*, the saturated brine is thoroughly filtered through a bed of *un*dissolved rock salt. The rock salt itself filters the brine. Nothing else is needed.

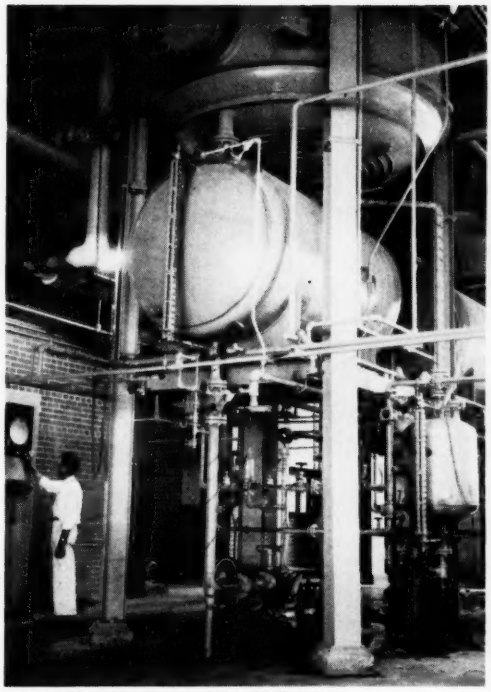
INTERNATIONAL SALT CO., INC.
SCRANTON, PENNSYLVANIA

SALES OFFICES: Atlanta, Ga. • Chicago, Ill. New Orleans, La. • Boston, Mass. • St. Louis, Mo. Newark, N. J. • Buffalo, N. Y. • New York, N. Y. Cincinnati, O. • Philadelphia, Pa. • Pittsburgh, Pa. Richmond, Va. • ENGINEERING OFFICES: Atlanta, Ga. Chicago, Ill. • Buffalo, N. Y. *Reg. U. S. Pat. Off.

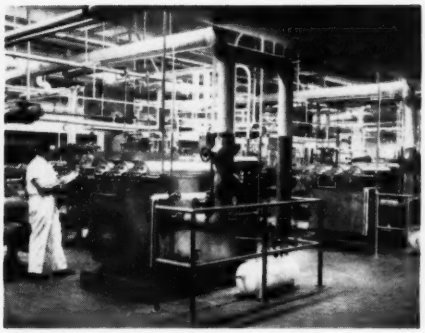
For more information, use coupon on page 177.

Exact control assures perfect quality with

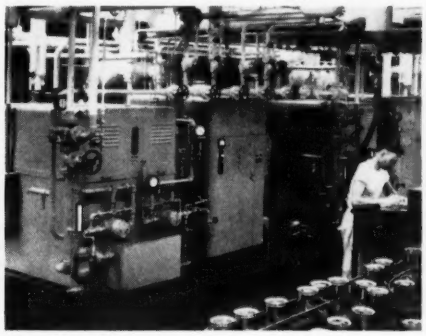
Votator® CONTINUOUS PROCESSING EQUIPMENT



VOTATOR Semi-Continuous Deodorizer



VOTATOR Margarine Processing Apparatus



VOTATOR Shortening Processing Apparatus

New plant of Mrs. Tucker's gets high capacity

with VOTATOR continuous processing apparatus

AT MRS. TUCKER'S large, modern plant in Jacksonville, Illinois, Girdler Company's facilities have been completely integrated to produce edible oil products of perfect quality in a closed, continuous system. Girdler equipment includes hydrogen plant, deodorizer, and margarine and shortening processing apparatus.

Here, in a matter of seconds, margarine and shortening are processed from deodorized oil to finished product at minimum cost by VOTATOR* Processing Apparatus. Practically automatic, the process is under precise mechanical control, guaranteeing desired texture, color and consistency . . . and at high production rate. Atmospheric moisture and contamination are totally excluded.

If you have a processing operation, investigate and find out how VOTATOR Continuous Processing Apparatus can meet your requirements, and improve your product.

*VOTATOR Trade Mark Reg. U. S. Pat. Off.

for...

COOLING

MIXING

PASTEURIZING

COOKING

STERILIZING

SLUSH FREEZING

CRYSTALLIZING
PLASTICIZING
EMULSIFYING

AERATING

WHIPPING

ENZYME
INACTIVATION

The GIRDLER Company

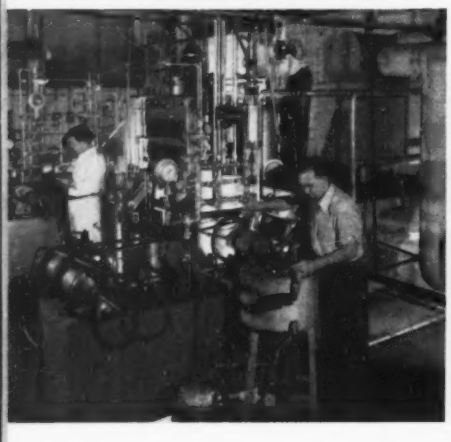
A DIVISION OF NATIONAL CYLINDER GAS COMPANY

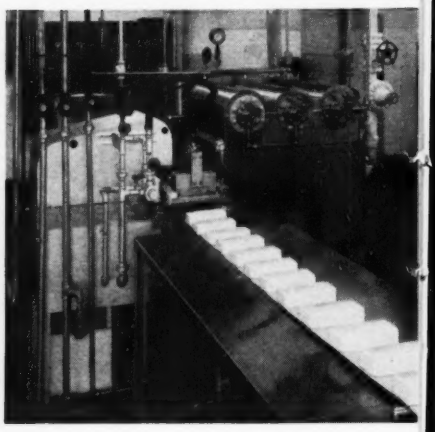
Votator Division

LOUISVILLE 1, KENTUCKY

GIRDLER...

DESIGNS **ENGINEERS** **CONSTRUCTS**





IN THE VAST FOOD INDUSTRY, processing plants from coast to coast, with a wide range of products, can testify to the complete service which Girdler provides . . . from process design to finished installation. They also represent savings of countless engineering manhours, and assurance of perfect end-product quality.

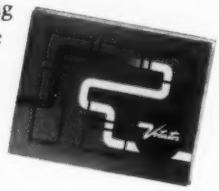
Girdler's VOTATOR Division is staffed with highly trained chemists and engineers whose years of experience can mean improved, profitable operation for you. These men have developed distinctive processes for such plant operations as cooking, cooling, bleaching, hydrogenating, plasticizing, winterizing, and deodorizing. In addition, Girdler's research and pilot plant facilities are available for development of new processes and equipment—or for special studies of new processing applications.

Why not put Girdler's experience to work for you?

THESE PRODUCTS CAN BE PRODUCED BETTER WITH VOTATOR CONTINUOUS PROCESSING APPARATUS:

- Marshmallows
- Cake Batter
- Dog Food
- Chocolate Milk Drink
- Edible Starch (For Salad Dressing)
- Pie Filling
- Soup
- Lard
- Margarine
- Shortening
- Sweetened Condensed Milk
- Eggs
- Concentrates, Fruit Juices and Purees
- Juice Concentrates
- Starch Gum Jellies
- Strained Foods

THIS 32-PAGE BOOK contains complete information on VOTATOR Continuous Processing Apparatus. A valuable 12-page technical section with reference data and charts is included. Send coupon today for your free copy.



THE GIRDLER COMPANY
224 East Broadway, Louisville 1, Kentucky

Send booklet V-39 describing Continuous Processing.

Name _____

Position _____

Company _____

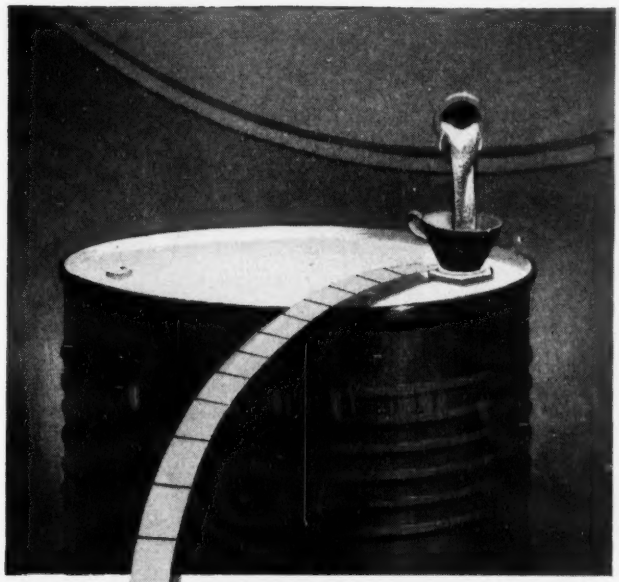
Address _____

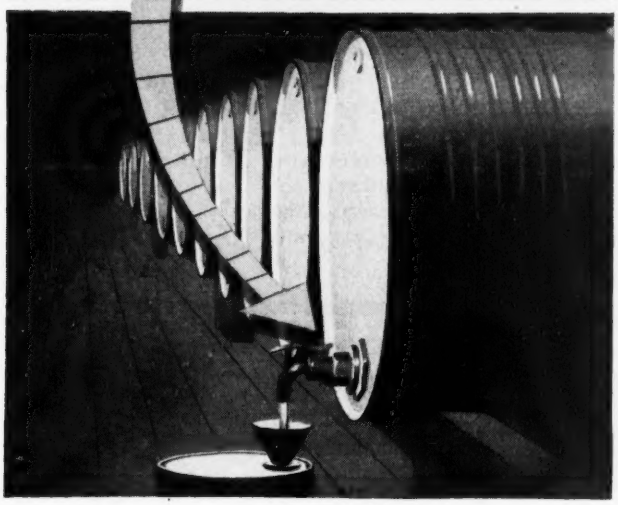
City _____ *State* _____

The **GIRDLER** Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY
VOTATOR DIVISION: New York, Atlanta, Chicago, San Francisco
LOUISVILLE 1, KENTUCKY

Do you go all the way with quality control?





AFTER so carefully maintaining the highest possible standards of quality during the manufacture of your products, it will pay you to protect that product quality during *shipping*, too. USS scale-free, rust-inhibited Drums will *keep* your products clean and uncontaminated. There is no grease, dirt or scale in a USS Steel Drum to affect its contents. A surface absolutely clean—physically and chemically—is covered with a tightly adherent, truly effective rust-inhibiting coating.

This means that USS Steel Drums are better for you . . . better for your customers. It means that you now have a dependable means of guarding the quality of your products *after* they leave your plant . . . that you can now take advantage of the great strength and durability of steel drums, and at the same time, be sure of contamination-free shipment and storage of products.

• • •

United States Steel Products fabricates stainless, galvanized, tinned, painted and decorated drums and pails. Furnished in capacities from 2½ to 110 gallons, with a variety of fittings and openings to fit your particular requirements.

WRITE FOR FREE BROCHURE

For additional information on this quality steel drum write to us at New York for this full-color brochure, "USS Drums—100% Scale-free and Rust-inhibited."

"It's Better to Ship in Steel"

UNITED STATES STEEL PRODUCTS
DIVISION
UNITED STATES STEEL CORPORATION
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
Los Angeles and Alameda, Calif. · Port Arthur, Texas • Chicago, Ill.
New Orleans, La. · Sharon, Pa.

USS STEEL DRUMS

USS

UNITED STATES STEEL

For more information, use coupon on page 177.

Nash Instrument Air Compressors deliver only clean air, free from oil or dust, and without filters

Here is Why!

You can dispense with oil filters and dust filters when you install ®Nash® Clean Air Compressors. You can save the cost of maintaining these devices. You can greatly reduce instrument maintenance costs. For the Nash employs no internal lubrication, therefore no troublesome oil is in the delivered air. Moreover, air from a Nash is thoroughly washed and cooled as it passes thru the pump. Dust in the plant atmosphere, even fly ash, is immediately removed.

®Nash® Clean Air Compressors are simple, with only one moving element. No valves, gears, pistons, sliding vanes, or other enemies of long life and constant performance complicate a Nash. No aftercoolers are needed. You will find it profitable to investigate these pumps, now.

No oil filters.
No dust filters.
No internal lubrication to contaminate air handled.
No internal wearing parts.
No valves, pistons, or vanes.
Non-pulsating pressure.
Original performance constant over a long pump life.
Low maintenance cost.

NASH ENGINEERING COMPANY
395 WILSON, SO. NORWALK, CONN.

Atlas Expands Food Emulsifier Production... Forms New Food Industry Division

Greater manufacturing facilities for food emulsifiers are being constructed by Atlas. This expanded capacity will make available freight savings and faster delivery to food processors in the United States and Canada from three strategically located production centers.

Atlas has also announced the realignment of its sales and research groups to form a special Food Industry Division.

Two New Plants

The larger of two new plants, located at Memphis, Tennessee, will be completed in late 1954. It will be situated adjacent to the Trendex plant of the HumKo Company, one of the country's leading producers of fats and oils. A second new plant is being built at Brantford, Ontario, by Atlas Powder Company, Canada, Ltd.

Both these plants will produce mono- and diglycerides and other emulsifiers which are widely used to improve the eating quality, appetizing nature and attractiveness of many foods. They find usage in bread and bread-type rolls, sweet yeast goods, doughnuts and all types of cakes, and prepared cake mixes; all-purpose and cake shortenings; margarine; peanut butter; ice cream; frozen desserts; and confections.

New Food Division Formed

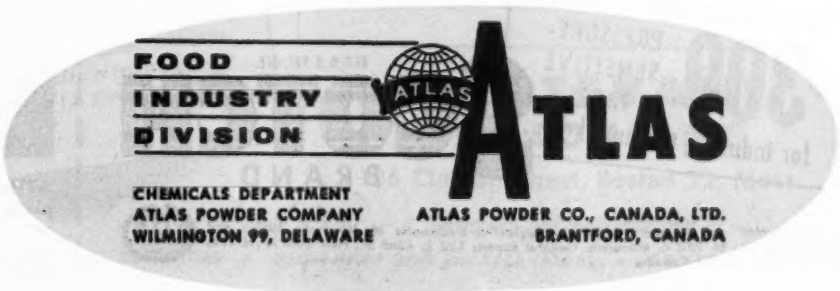
Recognizing the growing importance of chemistry in improving food products, and the specialized needs of food processors, Atlas has established a new Food Industry Division. This organization will be devoted to the development and marketing of Atlas food ingredients or adjuncts. A specialized group in the Atlas Central Research Laboratories has been organized to carry on continuing research work on food ingredients.

New Capacity Required

When the present standard of identity for bread was issued under the Federal Food and Drug law, Atlas's polyoxyethylene stearate emulsifier (Myrj® 45) was not included as an optional ingredient. Atlas therefore discontinued the sale of that emulsifier for major food uses, although it still is carrying on scientific studies looking toward the future establishment of the suitability of this emulsifier for major food uses. Atlas continues to supply the demands of the food industry for certain of its Span® and Tween® emulsifiers.

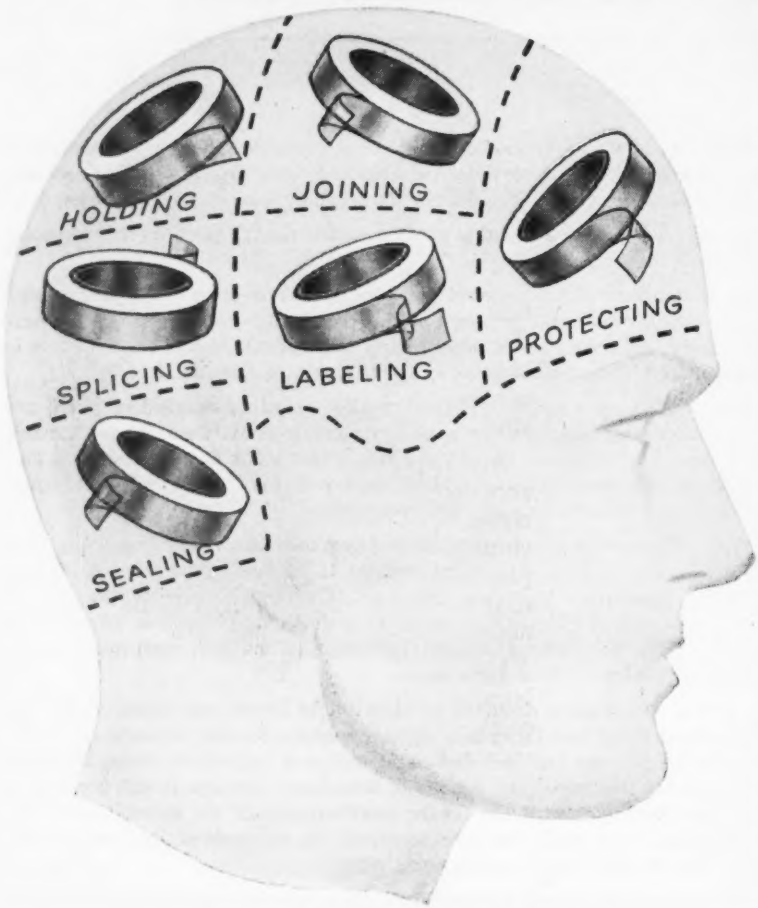
Since mono- and diglycerides were officially approved as bread ingredients, Atlas began the manufacture of these types of emulsifiers in its Atlas Point, Del., plant. Because of increasing demand for Atmul® and Atmos® mono- and diglycerides, production facilities are being expanded through the erection of the two new plants at Memphis and Brantford. Atmul emulsifiers are used chiefly by the bakery, shortening and margarine industries, while Atmos emulsifiers are used by the ice cream industry.

The construction of two additional emulsifier plants, together with Atlas's designation of a Food Industry Division, will lead to the development of improved products, greater savings and faster service for all sections of the food industry.



For more information, use coupon on page 177.

When you think of saving...
Think of TAPE!



Famous "Scotch" Brand Cellophane Tape is a time-saving, money-saving tool for every packaging problem. Remember, it's crystal clear and sticks at a touch—tighter than ever before. Use it for holding, joining, protecting—any of a thousand different jobs. Tape does it faster, better, cheaper!

For further information, just write on your letterhead to Department FE-54.

CELLOPHANE TAPE...ONE OF 300 PRESSURE-SENSITIVE TAPES for industry, trademarked...

REG. U.S. PAT. OFF.

SCOTCH BRAND

The term "Scotch" and the plaid design are registered trademarks of Minnesota Mining and Manufacturing Co., St. Paul 6, Minnesota. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ontario, Canada.

3M COMPANY

LOOK what you can do with it!

PUT EXTRA SELL on your combination "deals" with printed "Scotch" Brand Cellophane Tape. Back of "deal" can be held with transparent cellophane tape to avoid covering printing.

COMBINE two dissimilar products by banding them together with "Scotch" Cellophane Tape. Transparent tape allows labels to be read easily . . . doesn't interfere with printed designs.

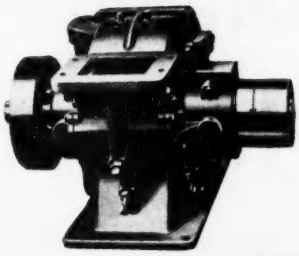
ADD PREMIUMS neatly and securely with cellophane tape and a "Scotch" Brand Definite Length Dispenser, Model 92. Dispenser turns out set length of tape ready for application.

ATTRACT customers to your shelf displays with that profitable "something extra". Premium units like this coffee and measuring cup are easily formed with "Scotch" Brand Cellophane Tape.

STURTEVANT

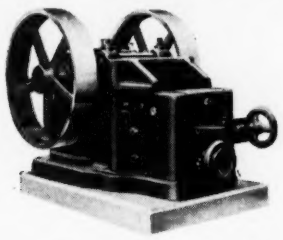
Laboratory Equipment...

assures accurate samples... cuts laboratory sampling costs



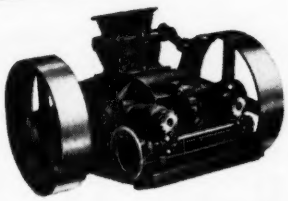
LABORATORY SWING-SLEDGE MILLS

Capable of reducing soft, moderately hard and tough or fibrous materials to any degree of fineness between 1 in. and 20 mesh. The patented "Open-Door" feature permits ready accessibility for cleaning.



LABORATORY JAW CRUSHERS

Special Roll Jaw action simplifies close regulation of the product with capacities varying from 300 to 400 lbs. per hour at finest settings, to 1000 or 2000 lbs. when opened for coarser work. Each part of the crusher is accessible for quick and easy cleaning.



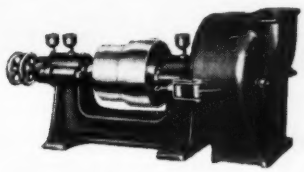
LABORATORY CRUSHING ROLLS

First designed especially for laboratory sampling work, Sturtevant Crushing Rolls are used regularly in many plants where there are limited out-puts. Range of output for the 8 x 5 size is from ½ in. to 20 mesh — and for the 12 x 12 size from ¾ in. to 20 mesh.

Sturtevant laboratory equipment have all the features of full-sized production machines with extra accuracy and wider range of adjustment built-in. They are fast . . . provide true samples of every batch processed.

All Sturtevant machines have "open-door" accessibility which permits quick, thorough cleaning . . . prevents the possibility of previous batches from contaminating new samples. Their rugged construction assures round the clock operation with practically no maintenance.

Investigate Sturtevant equipment for your laboratories. They will help you cut sampling costs . . . improve product quality . . . increase sales. Write for catalog, today.



LABORATORY SAMPLE GRINDER

Laboratory Sample Grinders are of the "Open-Door" disc type and are capable of very fine work, producing products as fine as 100 mesh (coarser if desired) when working on dry, friable, soft or moderately hard materials. Simply turn hand wheel to provide product regulation from 10 to 100 mesh.

STURTEVANT MILL COMPANY

106 Clayton Street, Boston 22, Mass.

Designers and Manufacturers of

CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

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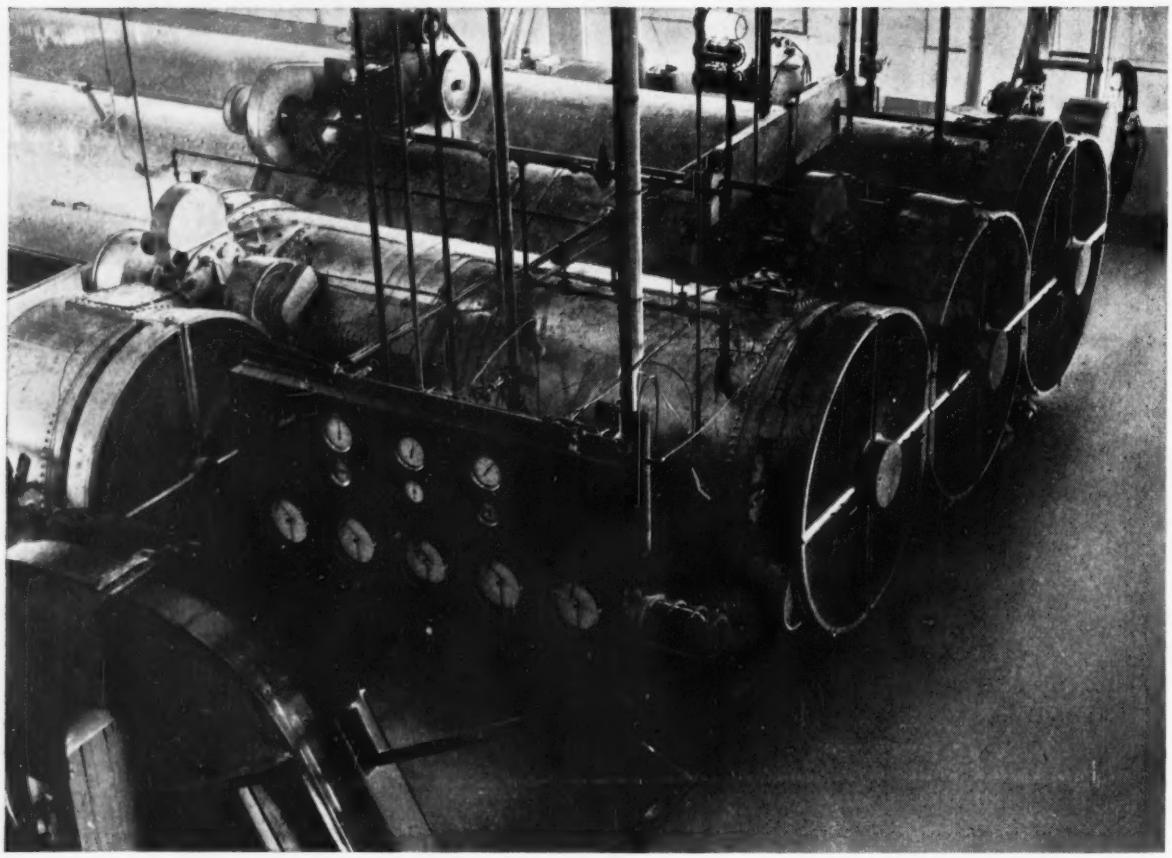
Continuous Pressure Cooker-Cooler under Taylor Control



On this continuous cooker-cooler (one of the world's largest) temperature and pressure are kept under complete and precise control by a battery of Taylor FULSCOPE* Controllers. Just set the instruments and forget them . . .

THE RESULT: Cans come out perfectly cooked, cooled and ready for labeling. Product is completely sterilized in the shortest possible time. Spoilage due to under-sterilization is practically impossible because of double safety features. And the desired color, texture and flavor are maintained.

IT MEANS increased profits, too, because steam consumption is kept to a minimum. There are practically no rejects, and supervisors are free for other duties.

There are Taylor instruments to cut costs and improve quality on almost every canning process. See your Taylor Field Engineer, or write for **Catalog 500.** Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.

Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

*Reg. U.S. Pat. Off.

For more information, use coupon on page 177.

We're simply taking our cue from the advertising of nationally merchandised goods when we say this about your food or beverage product:

IT'S ONLY AS GOOD AS ITS FLAVOR!

That is why it's a good idea to discuss the flavoring of your product with top specialists in this field *before* introducing it to the trade. And, if we may say so, we believe you will save yourself time and money, and get more dependable and better results, by coming directly to FRITZSCHE . . . *A FIRST NAME IN FLAVORS SINCE 1871.*

FRITZSCHE *Established* 1871 *Brothers, Inc.*

PORT AUTHORITY BUILDING, 76 NINTH AVENUE, NEW YORK 11, N. Y.

BRANCH OFFICES *and* °STOCKS: *Atlanta, Georgia, Boston, Massachusetts, °Chicago, Illinois, Cincinnati, Ohio, Cleveland, Ohio, °Los Angeles, California, Philadelphia, Pennsylvania, San Francisco, California, St. Louis, Missouri, °Toronto, Canada and °Mexico, D. F.* FACTORY: *Clifton, N. J.*

"You see POWELL VALVES everywhere!"

And no wonder! For The William Powell Company makes more kinds of valves and has probably solved more valve problems than any other organization in the world.

Wherever flow requires dependable control, there's the place for Powell Valves—famous for dependability since 1846. Made ⅛″ to 30″ and 125 pounds to 2500 pounds W. S. P. Bronze, iron, steel and corrosion resistant alloys. Available through distributors in principal cities. On problems, write direct to The Wm. Powell Company, Cincinnati 22, Ohio.

CONTROLS FOR THE LIFE LINES OF INDUSTRY

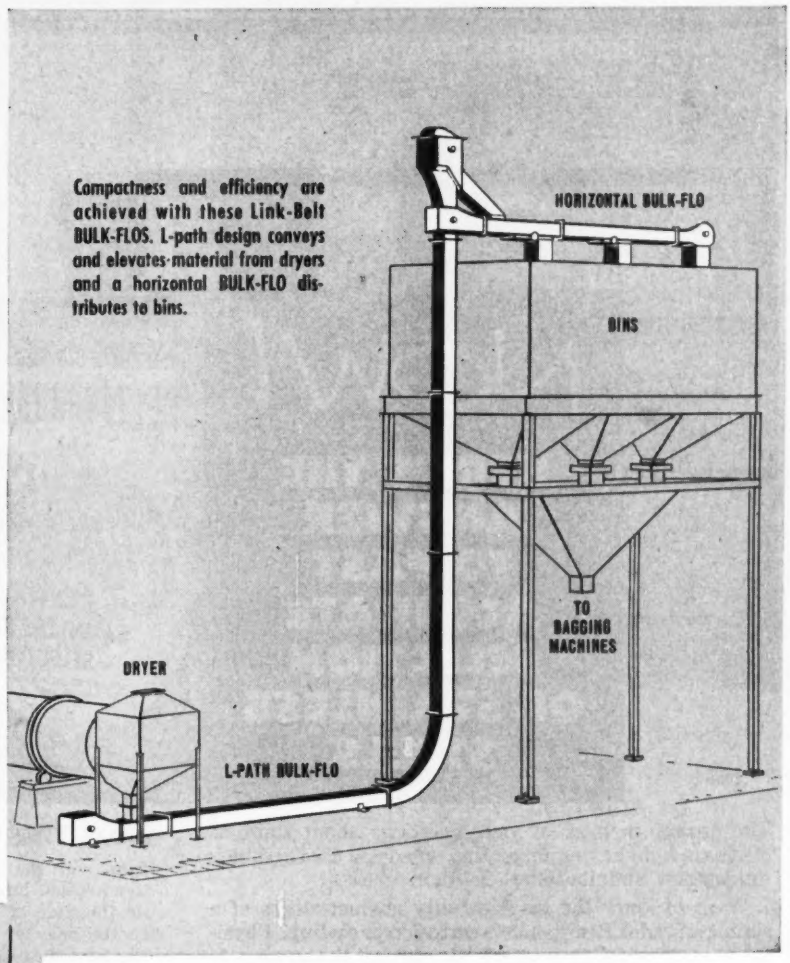
Powell Valves

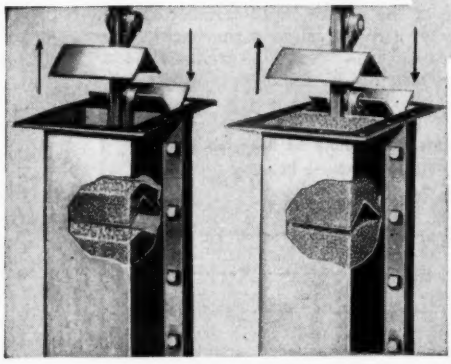
108th year

With Bulk-Flo you feed, convey, elevate in one compact, fully enclosed assembly

Get lower handling costs on a wide range of materials

YES, a single BULK-FLO can move material horizontally, on an incline, vertically or many combinations of these. That means fewer units . . . less space required . . . lower costs for most handling requirements. What's more, solid flights provide positive movement of a wide variety of materials—fully or partially loaded. And the individual "compartments" insure gentle handling. Ask your nearby Link-Belt office for further information or send in coupon for Book 2475.


Compactness and efficiency are achieved with these Link-Belt BULK-FLOS. L-path design conveys and elevates material from dryers and a horizontal BULK-FLO distributes to bins.
HORIZONTAL BULK-FLO
BINS
TO BAGGING MACHINES
DRYER
L-PATH BULK-FLO



Fully or partially loaded, BULK-FLO provides positive, gentle movement of material. Unlike conventional designs, BULK-FLO's capacity can be varied by regulating feed to meet demand changes.

LINK-BELT

BULK-FLO FEEDERS, CONVEYORS, ELEVATORS 13.205

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities.

LINK-BELT COMPANY
Address your nearest office

Please send me immediately a free copy of your 28-page BULK-FLO Book 2475.

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For more information, use coupon on page 177.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
CORROSION RESISTANCE
RESISTANCE TO SCALING
MACHINABILITY
Crucible
NOW!
HERE'S THE ANSWER TO FAST ACCURATE SELECTION OF STAINLESS STEELS
Crucible
REZISTAL® STAINLESS STEEL SELECTOR
FOR MAKING THE MOST OF STAINLESS STEEL
NOMINAL COMPOSITION

The answer to most of your questions about stainless steels are right at your finger tips, when you use Crucible's unique new Stainless Steel Selector.

Want to know the machinability characteristics of a stainless grade? Resistance to corrosion or scaling? Physical or mechanical properties? You can get the answers to these and other questions simply by setting the arrow on the Selector slide at the proper window. It's just as quick and easy as that.

And almost as fast as you get the answer, you can get the steel you need. For many of the REZISTAL stainless steels shown on the Selector are carried in stock in Crucible warehouses conveniently located throughout the country.

To get your free copy just fill in and mail the coupon. Better do it now.

HOW THE SELECTOR WORKS:

Start with the problem. For example, resistance to corrosion in contact with copper sulfate. Just set the slide at the proper index number shown on the Selector (in this case on the back), and you have the answer in a second – grades 302 and 316 are fully resistant to this form of attack.

Crucible Steel Company of America
Dept. FE, Henry W. Oliver Building
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Name_____

Company_____ Title_____

Address_____ City_____ State_____

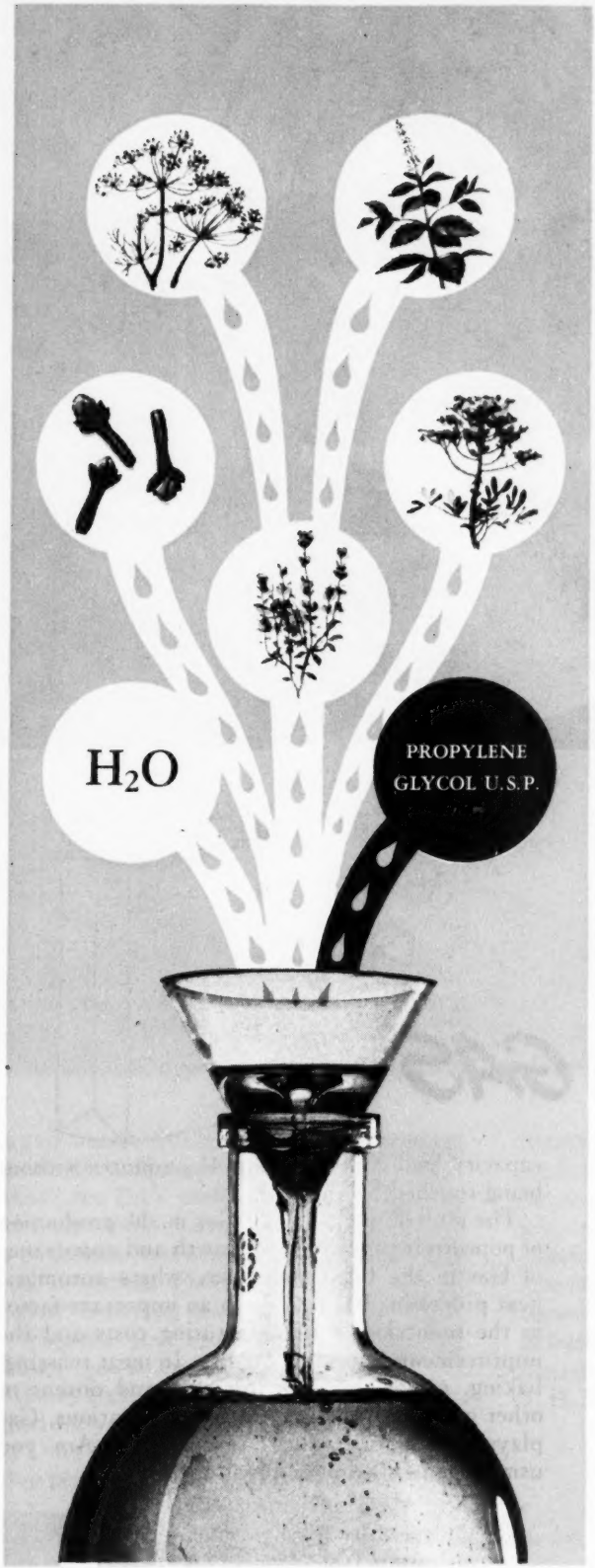
CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking

STAINLESS STEELS

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • MAX-EL • ALLOY • SPECIAL PURPOSE STEELS



DOW

DOW PROPYLENE GLYCOL, U.S.P.,

the highly versatile solvent for your flavors and extracts . . .

. . . gaining wide acceptance for its solvent efficiency and economy over a broader range of materials.

Big reason for the success of Dow propylene glycol, U.S.P., in the food field is its high degree of solvent action over the broad range of flavoring raw materials required today. By utilizing these advantages in your operation, you will undoubtedly gain still another advantage—economy in manufacture.

Food colors have also been improved by propylene glycol with only slight alterations in basic formulations. Emulsified flavors benefit from the very effective wetting action of propylene glycol which gives increased stability to the emulsions formed.

For an answer to the big question—"How can Dow propylene glycol, U.S.P., improve my product?"—send for a free sample and information on its properties. THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. OC 828E.

you can depend on DOW CHEMICALS

DOW

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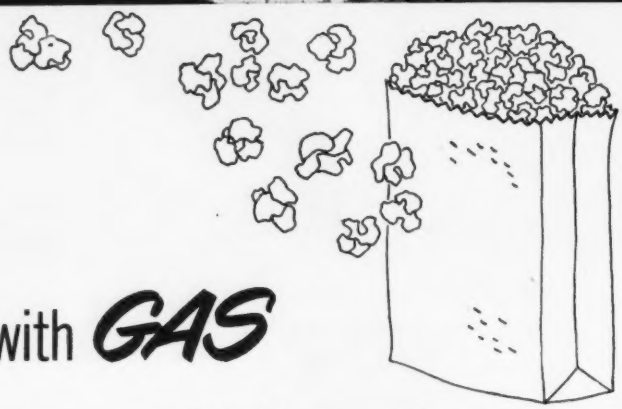
The corn is popped in stainless steel Dunbar Gas-fired cornpoppers.



POPCORN

is big business when mass-produced with *GAS*

Popcorn is an American institution. In the operation of a theater, the popcorn stand in the lobby is frequently a major source of profit to the operators. The production of it is big business, and these giant Gas-fired rotary poppers make it a production-line operation.

For instance, one plant in California supplies popcorn for 141 Fox West Coast theaters, located between Bakersfield and San Diego. A battery of six rotary units operating completely automatically pop the corn, and discharge it ready for seasoning and packaging. In each Gas-fired corn popper, a capacity load is processed in 4½ minutes without being touched by the operator.

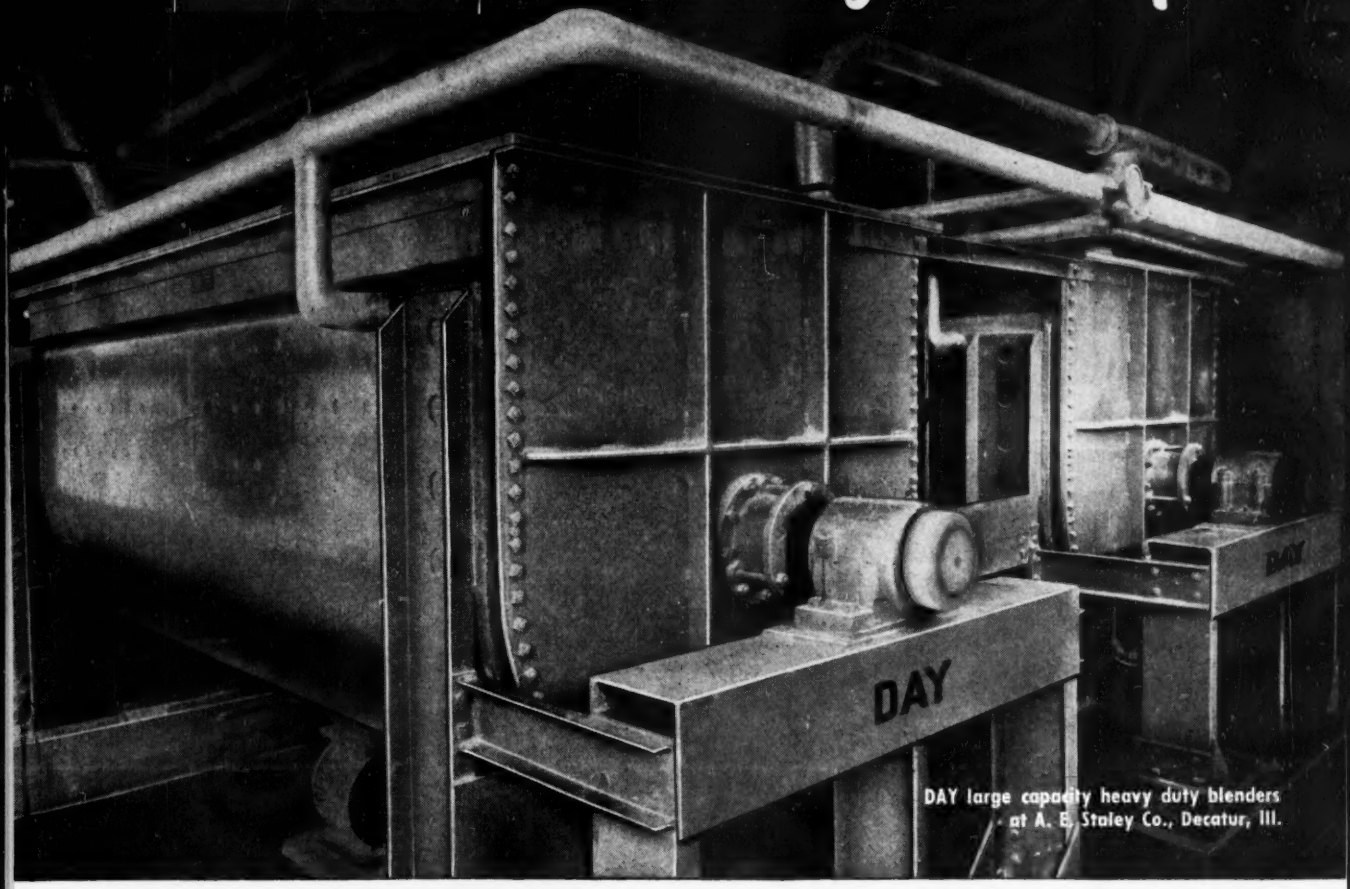
The growth of the use of Gas in the production of popcorn is typical of the growth and importance of Gas in the Food Industries, where automatic heat processing has been such an important factor in the reduction of manufacturing costs and the improvement of product quality. In meat roasting, baking, cereal and bean toasting and dozens of other commercial food processing operations, Gas plays a major productioneering role. Are you using Gas to maximum advantage?

MORE AND MORE... THE TREND IS TO GAS

AMERICAN GAS ASSOCIATION 420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK

For more information, use coupon on page 177.

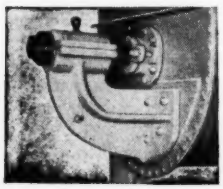
DAY means longer life span



DAY large capacity heavy duty blenders at A. E. Staley Co., Decatur, Ill.

Rugged construction plus precision engineering . . . that's the DAY combination that means *extra* years of trouble-free, economical operation. Plant after plant is finding this true. Whatever your special need, you'll find a DAY Heavy Duty Blender designed for you. Special DAY features on this Heavy Duty Blender have been developed to provide top performance and extra-long equipment life span. The DAY dry color agitator is designed for heavy bodied powders. Other types of agitators are available to meet specific requirements. DAY large outboard bearing construction gives maximum shaft support, smooth operation. Exclusive stuffing box design prevents bearing damage from abrasive materials, and eliminates danger of product contamination by bearing lubricants. The DAY spiral ribbon agitator is designed for paste, semi-paste, granular or liquid products. For complete information or service, call your nearest J. H. Day field engineer or write for Bulletin 354-A.

DRY COLOR AGITATOR


OUTBOARD BEARINGS

SPIRAL RIBBON AGITATOR

FOUNDED 1887

when you buy **DAY** *you buy dependability*

THE J. H. DAY COMPANY

INCORPORATED

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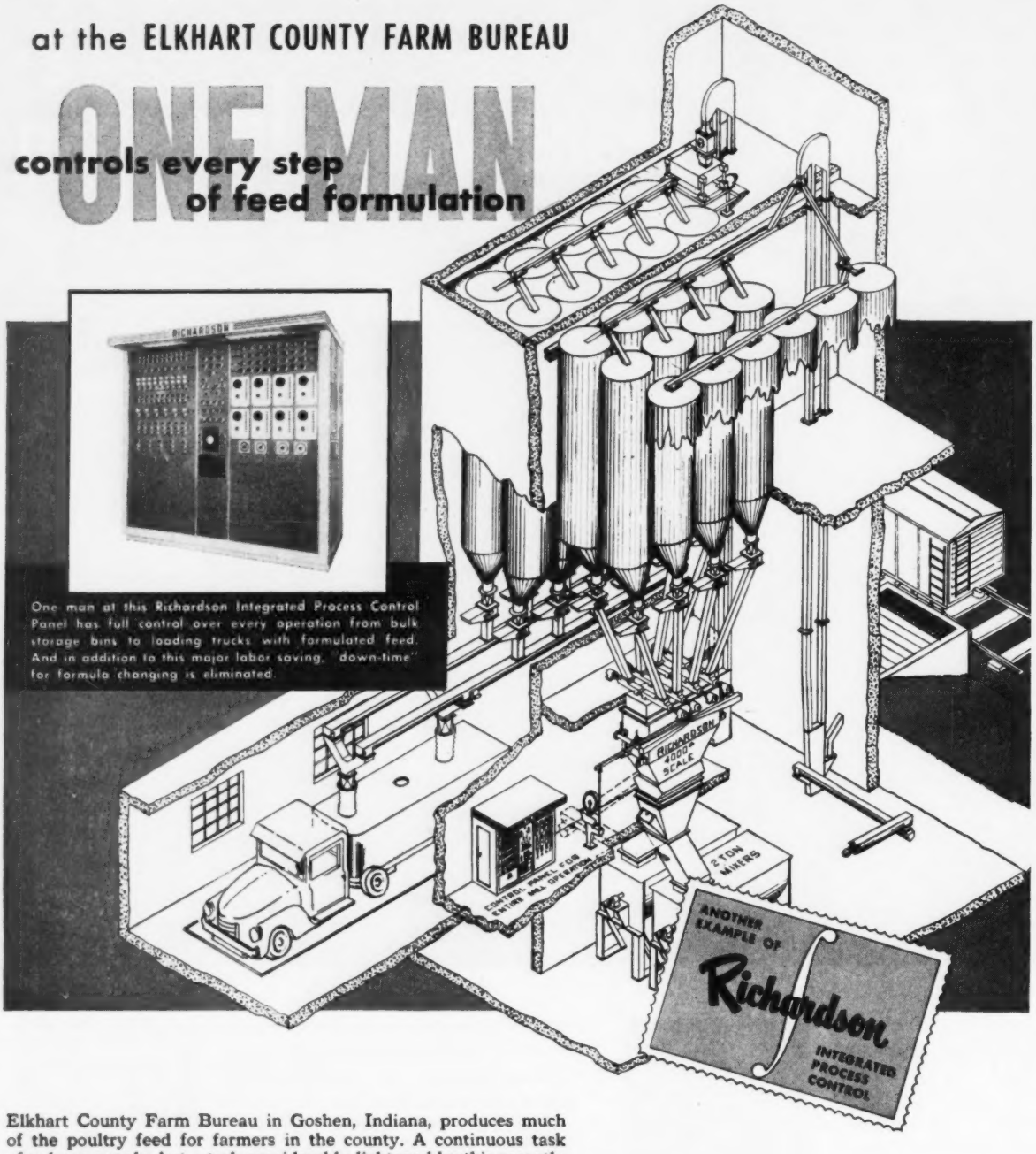
PRODUCERS OF QUALITY EQUIPMENT FOR BAKING • PAINT & VARNISH • CHEMICAL FOOD • RUBBER • PHARMACEUTICAL • COSMETICS • PAPER & PULP • EXPLOSIVES CERAMICS • CANDY • SOAP • SUGAR • MILK PRODUCTS • OTHER MAJOR INDUSTRIES

at the **ELKHART COUNTY FARM BUREAU**

ONE MAN

controls every step of feed formulation



One man at this Richardson Integrated Process Control Panel has full control over every operation from bulk storage bins to loading trucks with formulated feed. And in addition to this major labor saving, "down-time" for formula changing is eliminated.

Elkhart County Farm Bureau in Goshen, Indiana, produces much of the poultry feed for farmers in the county. A continuous task of volume supply, but a task considerably lightened by this recently installed system for complete formulation control.

Feed formulation is now a relatively simple procedure. Integration and sequence of all operations are quickly accomplished by remote *automatic control*. Production rates up to 60 tons per hour* are possible, using accurate individual discharges up to 4000 lb. In addition to allowing storage of grain purchased at favorable market prices, installation design also permits transfer of feed ingredients by remote control from any one bin to any other bin—or into formulation.

Complete systems for integrated process control are natural results of Richardson's fifty years' experience. Perhaps your feed formulation, too, could be improved for greater efficiency and savings. At no obligation our engineers will gladly survey your present installation and show you how Richardson Integrated Process Control can make your operation more profitable.

* Drawing shows 2 mixers giving 20 tons per hour total.

Richardson

MATERIALS HANDLING BY WEIGHT SINCE 1902

RICHARDSON SCALE COMPANY
Clifton, New Jersey

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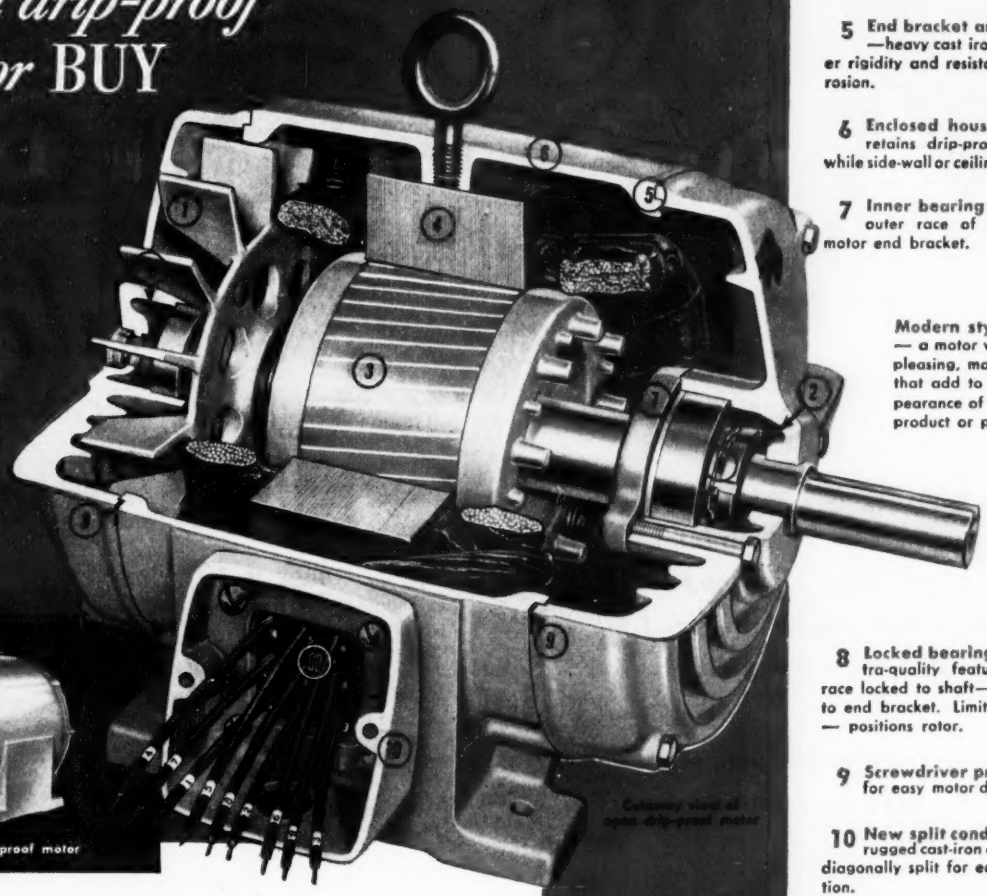
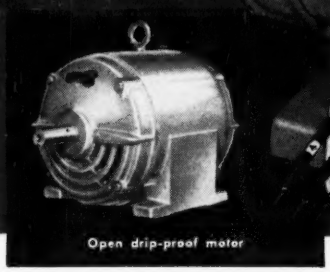
Here's the inside story of the
NEW L.A. *Line*

...your BEST *open drip-proof motor* BUY



Cutaway view of open drip-proof motor



Open drip-proof motor

1 **Fan** — efficient, non-sparking fan. New aerodynamic design for more effective cooling.

2 **Large grease chamber** — factory lubricated for years of attention-free service.

3 **Indestructible cast-aluminum rotor** — dynamically balanced with fan for smooth, quiet operation.

4 **Stator** — prewound stator core utilizes Formvar wire insulated with a new Alkyd Asphalt Resin insulating varnish.

5 **End bracket and housing** —heavy cast iron for greater rigidity and resistance to corrosion.

6 **Enclosed housing**—motor retains drip-proof features while side-wall or ceiling mounted.

7 **Inner bearing cap**—locks outer race of bearing to motor end bracket.

Modern styling — a motor with pleasing, modern lines that add to the appearance of your product or plant.

8 **Locked bearing** — an extra-quality feature. Inner race locked to shaft—outer race to end bracket. Limits end play — positions rotor.

9 **Screwdriver pry slots** — for easy motor disassembly.

10 **New split conduit box**— rugged cast-iron conduit box diagonally split for easy connection.

11 **Lead identification** — permanent, positive lead identification spacer in conduit box plus lead tagging.

Here is the new L.A. open drip-proof motor. It's completely redesigned inside and out to meet new NEMA standards. You get the advantages of Louis Allis's 52 years of motor building experience.

This motor is better protected, more drip-proof . . . has new bearing construction and improved insulation. Learn about these and the many other features of the new L.A. Line. Call your nearby Louis Allis Sales Engineer for information on this and our complete motor line.

THE LOUIS ALLIS CO.
MILWAUKEE 7, WISCONSIN

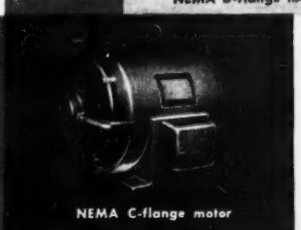
LA-106

NEMA D-flange motor

Vertical NEMA C-flange motor

We specialize in SPECIAL MOTORS *and* PROMPT DELIVERY, TOO

There's a Louis Allis special motor that does your toughest jobs better. Whatever electrical or mechanical modifications you need, check Louis Allis first.



NEMA C-flange motor

Time to double check VANILLA *Quality*

Many manufacturers today are revising their vanilla flavor formulations, and this is the time to put the stress on quality — make a change for the better. The trend is back to real vanilla taste and the standard Alva vanillas have been doing just this job for years.

In selecting any vanilla, pure or imitation, double check it with the finest pure vanilla extract. Then buy the best you can afford.

With the changing vanilla picture it is important that you check the famous Alva vanillas. There are many to suit your needs, both pure and imitation. The Alva laboratories are eager to help. Send us your problem.

PURE VANILLA EXTRACT
The finest extract, processed for over two months.

PURE VANILLA 4X
Same quality as above, four times stronger.

VANILLA-VANILLIN
The best pure extract extended with vanillin.

IMITATION VANILLA 4X
Developed on a natural vanilla bean base.

IMITATION VANILLA 4X (Special)
An inexpensive grade, excellent for specialties.

IMITATION VANILLA
A clean, brilliant flavor, fine as a chocolate stretcher.

VANILLA SUGAR (Imit.)
A dry imitation bean powder.

VAN AMERINGEN-HAEBLER, Inc.
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Alva FLAVORS

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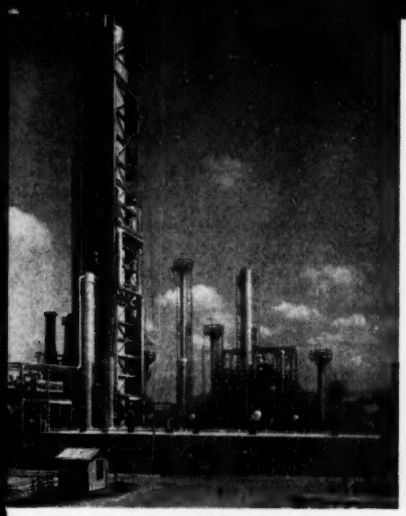
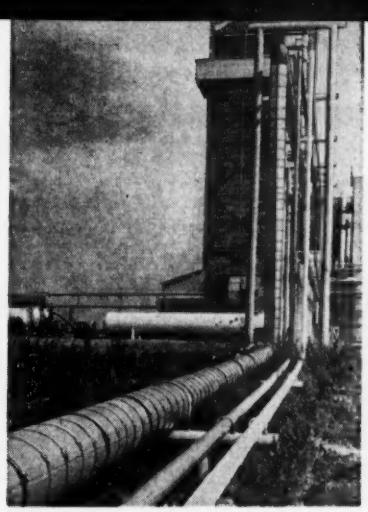
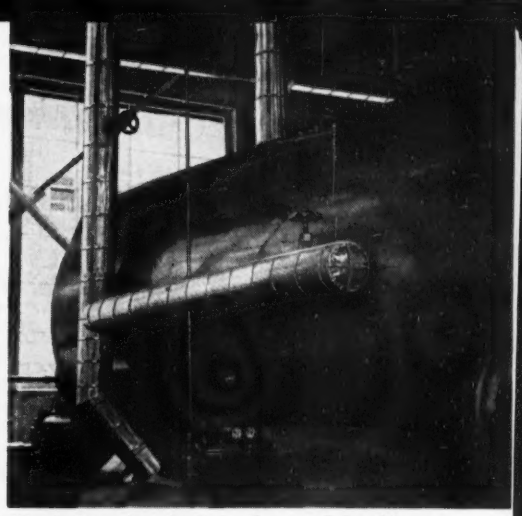


This big new Oklahoma refinery has used a new kind of aluminum jacketing throughout on both insulated lines and towers and vessels. Light in weight and low in cost, this new Childers Aluminum Jacketing cut installation costs. It is also expected to cut maintenance costs.



Childers Aluminum Jacketing is used here on a cross-country transfer line at a large chemical manufacturing plant in Texas. This is a rugged test for any jacketing, but the light-weight aluminum used in this jacketing should stand up to weather and chemical corrosion it encounters.

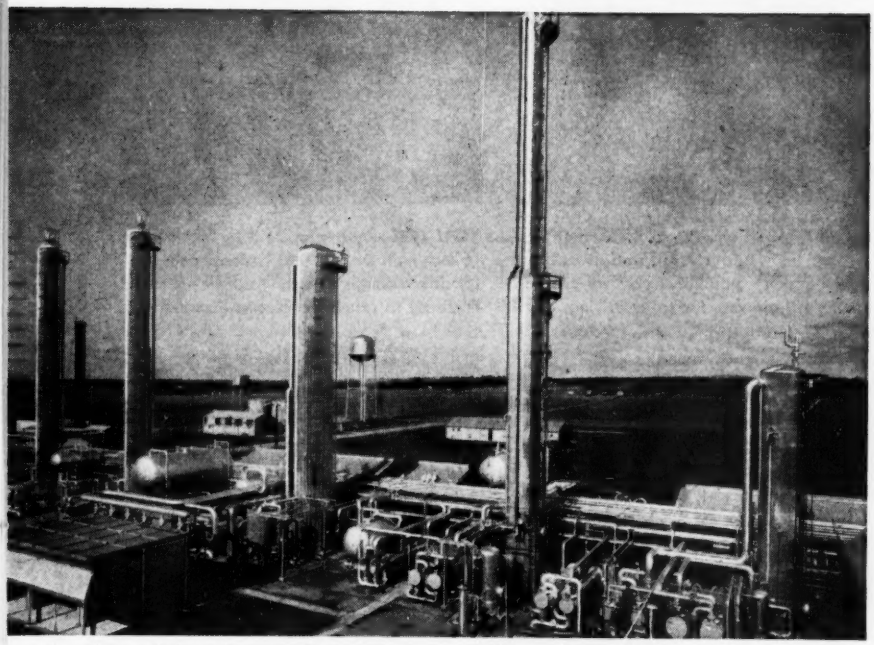


"Good Housekeeping" is the word in this gas pipeline pump station. The insulated lines are handsomely protected by Childers Aluminum Jacketing, which should last as long as the plant itself. The jacketing requires no painting and very little other maintenance. It even allows the interior of the plant to be washed with a hose without harm to the insulation. The chief engineer reports: "We have standardized on Childers Jacketing for all our insulated lines. It is doing an excellent job for us and saving us money."

How 5 plants cut costs of jacketing insulated lines

Weather-resistant, low-cost, easy to put on—these are big reasons for the growing popularity of a new jacketing, specially engineered for insulated lines. It is made of .006" thick aluminum and comes with or without a moisture barrier. It is called Childers Aluminum Weatherproof Jacketing. You can write for a free sample without obligation.

Address Childers Manufacturing Co., Dept. FE-6, 3620 W. 11th St., Houston 8, Texas.



Weather, wind and corrosive gases are not going to attack the insulation of this new plains-country gasoline plant. The insulation is protected by long-lasting aluminum: Childers Aluminum Weatherproof Jacketing. The management expects this low-cost jacketing to hold insulation maintenance costs to a minimum. Other advantages are that the jacketing went on quick and easy during construction; it required no special tools or skill—no shop forming or cutting. It can be taken off and re-used if lines are moved. Aluminum saves on painting and the tough 3S alloy used for Childers Jacketing should stand up for years even in highly corrosive industrial atmospheres. Check the advantages of this jacketing for your own plant.

Amazingly easy to handle, Childers Jacketing was applied here by men using no more than a wooden wedge and a pair of pliers. Childers has engineering representatives in every major industrial center who will be glad to confer with you on your particular jacketing problems. Write to address shown above.

Advertisement

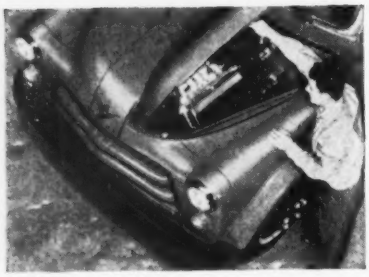
"Our new Dodge truck is a better deal for me and for my boss, too!"

Our new Dodge *"Job-Rated"* trucks have proved a better deal in handling ease, visibility, comfort and power. You, too, can save time and money, work and effort with these great new trucks. Find out today why Dodge means a better deal all around!

YOU GET—A Better Deal In Steering! Sharp 39° turning angle and short wheelbase design make Dodge the sharpest turning trucks on the road. That saves you *time!*

YOU GET—A Better Deal In Seeing! Big 951 sq. in. windshield of Dodge cab is largest of any popular truck. All-around visibility is tops, too, for safer driving.

YOU GET—A Better Deal In Sitting! The 16-inch-high Dodge seat is deep and comfortable enough to be in your living room! Plus easy-to-reach controls and dispatch box.



YOU GET—A Better Deal In Power! You save on maintenance because every Dodge engine . . . V-8 or Six . . . has such long-life features as exhaust valve seat inserts, chrome-plated top piston rings and positive-pressure lubrication.

New Dodge trucks give A BETTER DEAL FOR THE MAN AT THE WHEEL—and a better deal for the man who pays the bills. Test-drive and learn how a Dodge makes driving easier and does more work in less time. Give your Dodge dealer a call. He'll be glad to show you.

DODGE
"Job-Rated" TRUCKS

TUNE IN: "Break the Bank," Sunday TV—"The Roy Rogers Show," Thursday radio—"Make Room for Daddy," Tuesday TV.

Tops in Quality
Competitive in Price.

why New DIEHL Type "D" Motors *are your best motor buy...*

These desired characteristics are inherent in the
NEW DIEHL TYPE "D" MOTORS

STATOR INSULATION is doubled in dielectric strength and exceptionally resistant to moisture, oil, chemicals and abrasion.

LEADS are specially insulated, last longer. Occupy less space. Permanently numbered to save wiring time.

BALL BEARINGS are oversize to provide excess load capacity. Pre-lubricated for years of trouble-free service.

INDESTRUCTIBLE ALUMINUM ROTORS. Keyed to the shafts in most frame sizes to prevent looseness under unusual and severe load conditions.

These, *and many other features*, backed by 68 years of motor-building experience, make Diehl Motors *your* best motor buy. We will welcome an opportunity to provide detailed information on Diehl Motors to meet your specific requirements.

Former N.E.M.A. Standard frame sizes still available for interchange and replacement.

Cutaway view of new Diehl Type "D" Motor

Motors that require least maintenance, stay on the job longest and deliver peak performance under the most severe operating conditions assure *maximum value per dollar invested.*

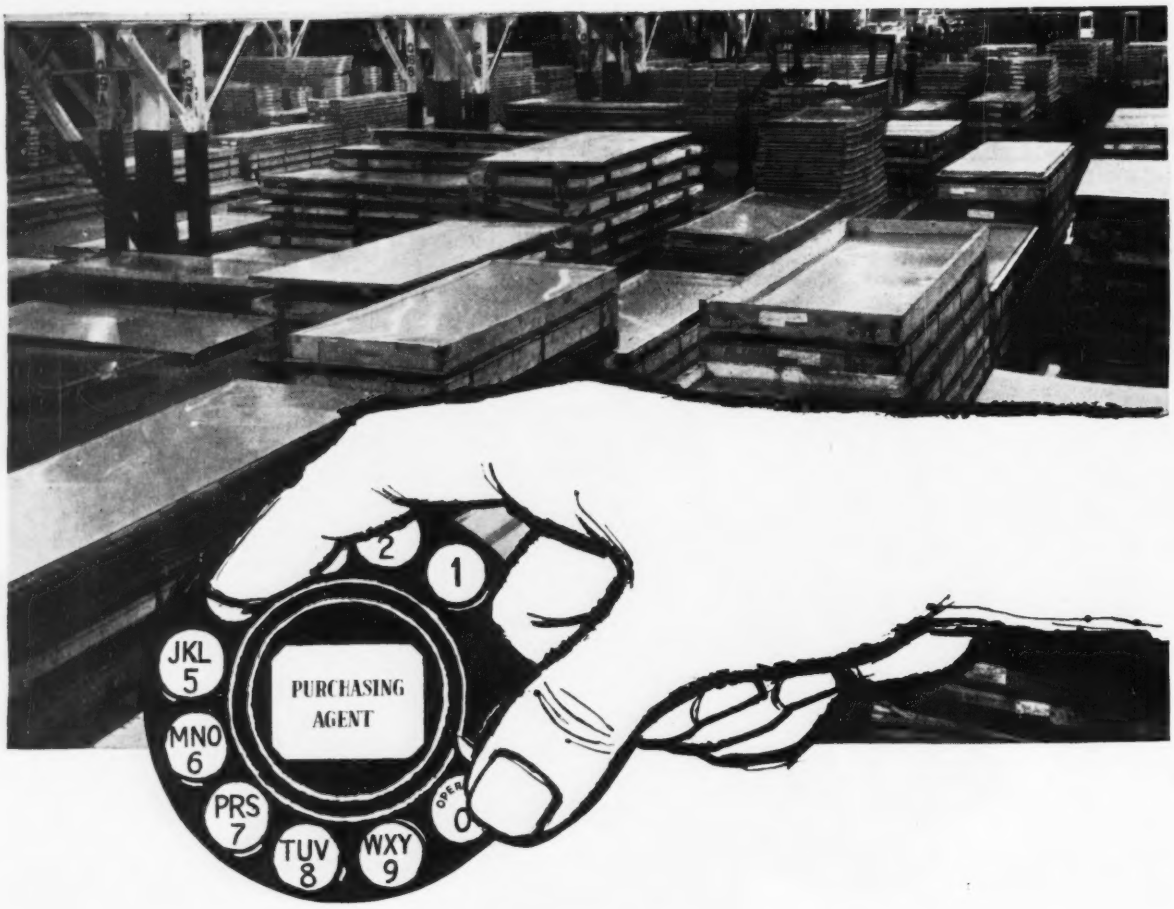
DIEHL MANUFACTURING COMPANY
Electrical Division of THE SINGER MANUFACTURING COMPANY
Finderne Plant, SOMERVILLE, N. J.

Please send me the following bulletins
☐ Type "J" Power Transmitter Bulletin No. FE-3303,
☐ Consolidated Motor Catalog and Price List No. FE-3310.

Name_____
Company_____
Street_____
City_____ State_____

OTHER INTEGRAL AND FRACTIONAL HORSEPOWER MOTORS ARE AVAILABLE IN A WIDE RANGE OF TYPES AND SIZES

For more information, use coupon on page 177.



Stainless steel . . .

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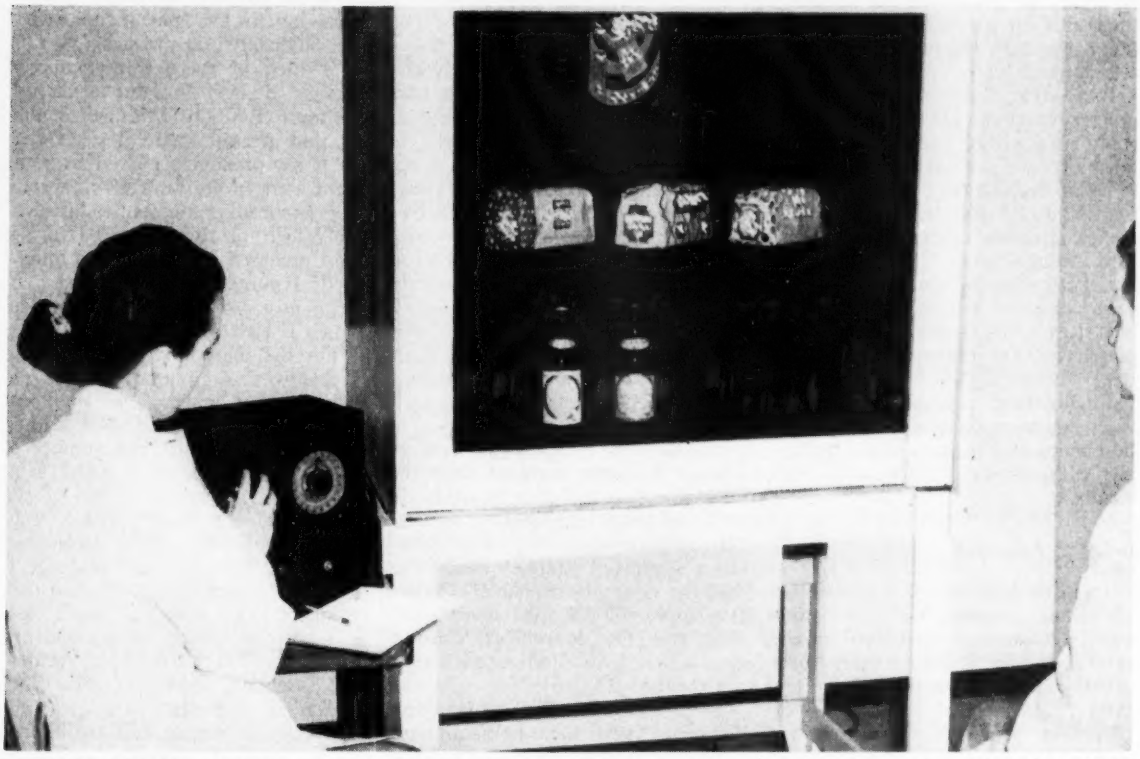


PACKAGE DESIGN and labeling are checked for recognition value, legibility, and attention with quick-flash tachistoscope. Both real and jumbled layout and labeling are used to measure shape, size, and color effects.

Gaging Foods *by Psychometrics*

By emphasizing human reactions rather than product, the psychologist obtains more accurate information than with other types of research. Instruments play important role in controlling observer's environment

DEAN FOSTER

Director of Laboratories, United States Testing Co., Inc., Hoboken, N. J.

In striving to compete in today's tough market, the progressive manufacturer is specially concerned with the following questions about the quality of his product:

- **How uniform is it?**
- **What are its positive and negative properties?**
- **How can it be improved?**

These queries can be answered satisfactorily only after a systematic study of reactions of people to his products. Here, human reactions are primary, hence it is only logical to turn to psychologists for the solutions.

Actually, however, specialists in human behavior have rarely applied their science to product evaluation. The principles of psychological measurement, carefully formulated during 100 years of experimentation, have usually been ignored, with each investigator commonly electing to start anew.

Within the field of food evaluation a number of researchers have pointed out that many of the studies reported are perfect models of what experimental procedure should not be.

By contrast, some reports by non-psychologists describing consumer product analyses show a refreshing awareness of the principles of pyschophysics and psychometrics. Reading, study, and experience have taught these investigators to avoid the mere common sense approaches employed by others.

For the purposes of this paper, we must answer the question:

As for assisting the food manufacturer in product evaluation, in what ways is the psychologist better prepared than an individual trained in any other discipline?

Answer rests, at least partially, with his orientation. As a behavior spe-

cialist his policy is never to test a product itself, but to study the reactions of individuals to certain stimuli, which, in this case, happen to be industrial products. He focuses, then, not on the pea soup but on the consumer's reaction to the pea soup.

In addition, the psychologist enjoys other advantages. He is equipped to apply methods of known value and reliability without the need for a series of trial-and-error developmental procedures; he will arrange his experimental situation in the best interests of his respondents.

Let us state the thesis in another way: When we are measuring human reactions, the emphasis must be placed on the respondent and not solely on the product.

Finally, the psychologist is specially equipped to interpret responses he obtains and then to adjust his analytical methods in relation to the results.

Indirect Approach

In many instances, it is of interest to obtain considerable information about consumers' attitudes toward certain products. Advertising and other educational media have often produced a general bias or set of prejudices which may influence response to an object being tested. Alternately, they may suggest new ways of approaching the problems or totally new test hypotheses.

Here, we have employed sentence-completion or word-association approaches. In such phrases as the following, the consumer is asked to fill in or check:

1. I hate luncheon meats that always are ————.
2. A cake mix must ———— in order for it to be any good.
3. A really good can of sardines must cost at least (check one): 10c. —, 25c. —, 75c. —, $1 —.
4. In choosing a shortening, I am particularly concerned with its ————.
5. I don't like powdered milk because ————.
6. Most of the less expensive cheeses are ————.
7. I know it is better to buy a premium beer because ————.

Answers begin to assume a pattern that amazes the psychometrist and the food technologist alike. For example, beef alone may prove to be a pleasant association for most, while lamb may be associated with an unpleasant odor. Salad dressing may, by association, either be for the affluent or for the hoi polloi. And it may be learned that milk is believed useful only for certain age groups. So, it can be that the indirect approach leads to very useful information whereas the direct is only misleading.

A Test Case

To illustrate another difficulty encountered in attempts to get true expressions from consumers, let us look at a very simple example:

Consumers returned to the stores a large number of packages of a certain product, believed to be stable. They complained of odor. Some mild deterioration had apparently affected the contents. But the manufacturer was uncertain whether or not he should attempt to withdraw all of this product from the market. Only if the negative consumer reaction was general did he wish to undergo such expense.

Obvious way to determine if a significant consumer segment finds the odor objectionable is to question directly in some such manner as this: "If you purchased this product (hand out a complaint sample) would you find the odor objectionable?" When this approach was tried upon secretaries and other convenient "consumers," about 1 in 6 advanced a mild objection.

Does such a procedure give a true answer? Or will there be many more complaints forthcoming? To recheck, why not resort to a common psychological technique? It is known that in many instances a simple, indirect question is more effective in obtaining an individual's "real" reactions than is the direct avenue. Projective methods such as the ink-blot (Rorschah) and the tell-a-story-about-a-picture tests are premised on this knowledge.

And so, the indirect approach then was employed on a second group of consumers, who were asked:

"Please note the odor of this product. Do you believe your friends or acquaintances who might buy it would object to the odor of it?"

When they "projected" themselves into the position of others, about 90% objected. The reasoning of the test consumer is stated somewhat like this: "I myself am rather tolerant, but I am sure Mabel, John, and Harry would object strongly to this odor."

As a consequence of the latter test, the vendor quickly recalled all of the merchandise. And later the pattern of store returns indicated that the indirect questioning more nearly evoked the truth than did the direct approach.

Representative Questions

In other cases typical of those referred to our Psychometric Laboratories, the problems are not nearly so simple and must be subjected to many different approaches. Such questions as the following require answering:

"Is my product sufficiently uniform from lot to lot, and if not, what specific quality is at variance?"

"Which of these three proposed package designs is most attractive, has most attention value, best legibility, and greatest apparent size?"

"Is my product perceived to be as permanent in its protective capacity as its two leading competitive brands?"

"Which of these three flavors is most preferred in a dehydrated soup?"

"If I must sacrifice color, odor, or flavor in a projected product change, which is least important?"

For the solution of each of these problems, it is necessary first to obtain the test materials in the form in which they are used. We learned many years ago that the number of consumer respondents or panel members can be reduced by use of the actual product under known, controlled conditions. Since memory is imperfect, little precise knowledge is gained by asking consumers what they think of Doe's catsup or Roe's oleo.

If precise control of respondents' environment is not provided, incidental distraction, misinterpretation of instructions, and other factors, can destroy the sensitivity and significance of any study. Incidentally, we find in this same context that it is only wastefully wishful to expect Mr. or Mrs. Consumer to design or redesign your product.

They are not sufficiently motivated, nor are they articulate or experienced enough to tell you what consistency a cream cheese should have or what odor is ideal in a hand soap. Under the right conditions they can provide almost unlimited information about the present product, but rarely can they state what should be done to improve it.

Before proceeding with other illustrations, perhaps we should define some of the terms we have used and will use.

Definitions

First, what is the difference between *psychometrics* and *psychophysics*?

Psychophysics can be illustrated by a test of the perceived length of three lines on a sheet of paper or of the perceived weight of three scraps of paper. In each instance, the psychological judgment can be checked with the aid of a simple physical measure of linear or weight dimensions, such as a foot ruler or a balance.

When it is not possible to apply a parallel physical scale, then the study

becomes clearly psychometric. For example, there is no physical measure of the beauty of a package or a lady, of the flavor of beef stew, or the readability of a label. Here we must turn to psychometrics. In certain cases, no physical measure has yet been devised, as in the case of odor. And in other examples physical measures are too insensitive to be of help, as with tactual qualities.

Numbers Not Valid

We must remember, too, that mere physical measures of the stimulus materials may be meaningless or misleading. For example, pH readings of marmalade may disagree with perceived flavor, or, similarly, rheological assays (re flowing characteristics) of a shortening may bear no relation to the greasiness or fluffiness of the preparation.

Some texts list more than a hundred variations of the comparatively small number of basic psychophysical and psychometric methods. Most familiar concern limits, equal appearing intervals, constant stimulus differences, production, and average error, all of which are basic to psychophysics, while paired comparison, rank order, triangle and single stimuli tests are more common to psychometrics.

We mentioned the absolute judgment or rating scale methods. It should be remembered that no judgment is ever strictly absolute but is always comparative in the sense that one's experience invariably influences the so-called absolute judgment.

As a consequence, at least the most recent observer experiences should be controlled or taken into account. A rank-order indication with more than five items may cause trouble in interpretation, for the reason that interest wanes with the long task of arranging in order, and with lack of interest goes the sense of responsibility for best effort.

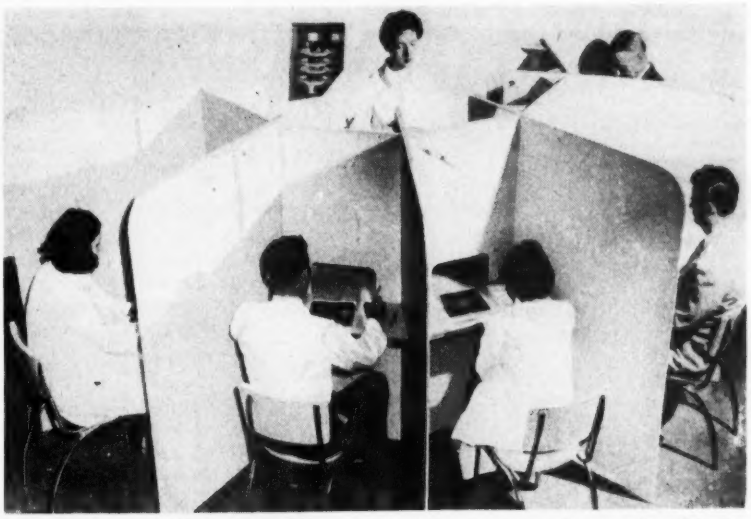
Before turning to the use of the methods we have just mentioned, we will examine in broadest terms how they may be applied to difference determination, preference study, and quality analysis difference.

Difference methods may be divided into two groups, one of which includes a designated standard for reference while the other requires that the observer examine all stimuli from some particular point of view dictated by the instruction. In certain cases, one approach is more sensitive, while in others the reverse is true.

Preference studies, by the same token, can be divided into comparative and absolute methods ranging from the simple "Which do you prefer" to the absolute rating scale of nine points applied to a single product. In many instances, we find comparative methods impractical and must resort to the absolute. When both can be used, we have observed excellent agreement or correlation between methods.

Finally, the analysis of quality may be approached directly or indirectly, by classification or comparison, by description, or by general behavior study.

Let's begin with a study of shortening to illustrate the propositional approach that precedes the test work. When possible, the univariate procedure is most valuable in order that the relative importance of each can be assessed as it is individually studied.



MULTIPLE TESTING STATION is used when panel members make observations under rigidly controlled conditions. Some samples require twilight so panel members cannot be influenced by color or appearance.

General Propositions

1. *Differences Exist.* The composite of properties of shortenings produce measurable differences in their effect on: (a) baking, and (b) frying, etc.

2. *Quality Uniformity Makes Measurement Valid.* Variations in quality of a shortening produced by any given manufacturer are less than the differences between the products of various manufacturers.

3. *The Several Effects Produced Will be of Measurable Importance.* Differences in the several shortenings will produce a number of effects, each of which can be measured and assigned weights in relation to its importance to consumers.

From such a schematic series, the experimenter can readily list his parameters, designing in advance his test matrix. Also, he knows in advance how many subjects, observers, cooking and measuring equipment will be required.

Since standardization of procedure and statistical treatment of results is effected before beginning work, the post-experimental regrets are reduced. In addition to the laboratory work, the field testing is outlined in advance.

If it is necessary to learn how well a given can of shortening functions when used at home, whether or not it is confused with other similar goods, the different uses to which it is put, and the like, these supplementary field explorations are outlined at the time of starting the more rapid and thorough laboratory work.

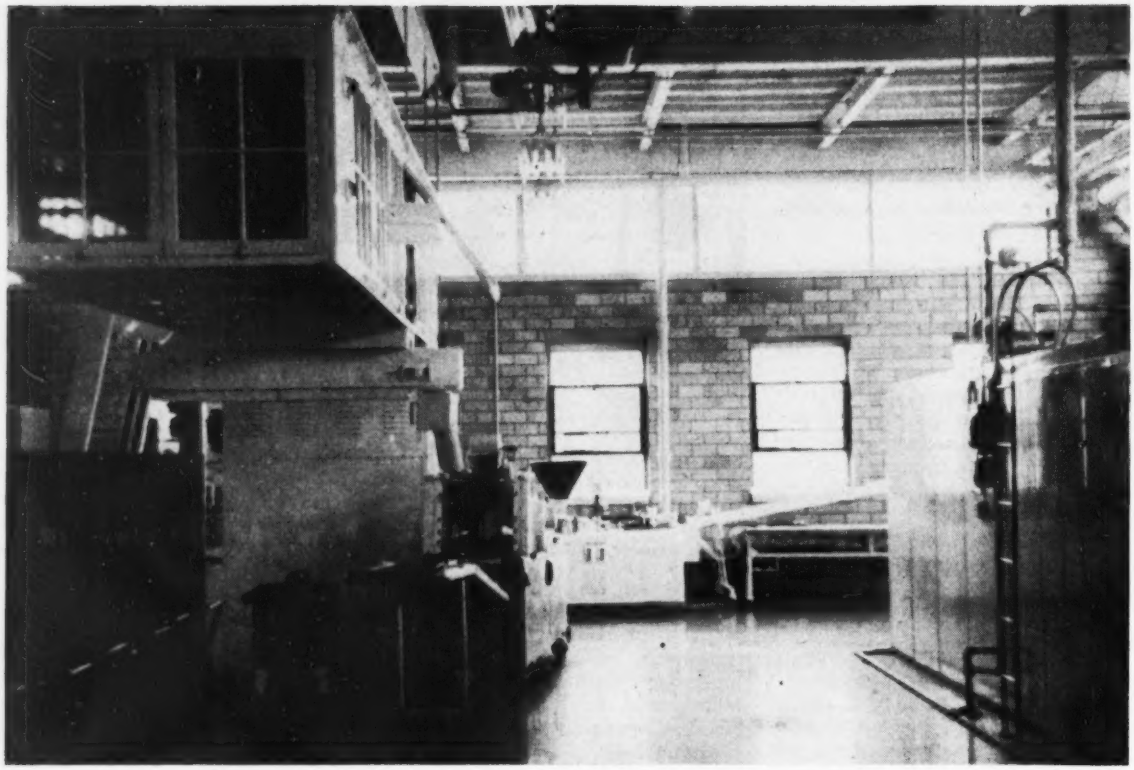
Select Trained Observers

While consumer work is in progress or before it starts, our practice is to subject the products under observation to controlled scrutiny of panels of trained observers. From these groups come the valuable analytic data which complete the picture.

Often the responses of these observers are directly predictive of results to be found when larger groups of untrained or naive observers are called in.

When, in a cosmetic evaluation, one lipstick was compared with another on the basis of physical data only, the two products were essentially equivalent in permanence or indelibility, smear resistance, and hue. Trained observers employed in analyzing two flavors under reduced illumination found that one was sweeter and more floral, while the other was dominantly fruity. The two could be differentiated visually in the stick, and differences were apparent in

(*Turn to page* 196)



FLOORS, WALLS, EQUIPMENT—all are spic-and span in this NBC plant (Plattsburg, N. Y.). Cleaning is by specially trained personnel under supervision of a sanitarian responsible directly to management.

You Do It *Better* When You

SANITIZE *SEPARATELY*

Clearcut, authoritative management of sanitation ups production, improves mechanical maintenance, lifts employee comfort, safety

J. LLOYD BARRON
Sanitary Engineer, National Biscuit Co., New York City

What's to be gained by separating sanitary functions from mechanical maintenance functions?

From our experience at National Biscuit Co., both thus will be improved. Not only that, but plant production will be boosted, employee comfort and safety will increase, and plant appearance inside and out, will be enhanced.

►In food plants particularly, where sanitation of the product itself is required, separate and authoritative management of sanitary maintenance plainly is essential.

We even may site part of a verse from II Corinthians: "Come out from among them, and be ye separate". Baldly stated, sanitary maintenance in an industrial plant is, by its very nature, so different in purpose and personnel that combining its immediate supervision with that of mechanical maintenance works to the disadvantage of both, but usually far more adversely to sanitation.

If, as a fundamental of organization, it is agreed that it is not good business to bind together two functions of a different nature within the operating responsibility of one person, then the task is to show that sanitary maintenance essentially is different from mechanical.

Having done that, it further would be necessary to demonstrate that a supervisor having two different jobs almost invariably will emphasize one and slight the other. What is emphasized and what is slighted will depend on the background of the supervisor.

Machines vs Environment

Precision, mass-production machines and high priced labor both require attention to their physical well-being so that they may function with maximum efficiency. To satisfy these demands, other machines and other labor have developed as specialized auxiliaries, one category ministering directly to the machines and the other

to the environment of the machines and of the men, raw materials, and products.

These two categories are not interchangeable; they are specialized, yet they are mutually dependent. And the specialization extends to the management of the two functions as well as to the rank and file workers—if both functions equally are to be well performed.

Competence in management precedes and is essential to competence in worker performance. A staff of mechanics, however capable, cannot make poor supervision good, but tends itself to deteriorate into sloppy inefficiency—which means emergency repairs rather than preventive maintenance.

Mechanics, electricians, pipe fitters, carpenters, oilers, and other specialists making up a mechanical maintenance department, are, or should be, skilled men with years of experience and a sense of responsibility. Supervision of the same caliber should schedule and coordinate their work as a general deploys an army for attack in accordance with a plan.

The major concern of such a department is to keep machines operating and to avoid interruption and downtime of vital production and essembly. Thought is focussed on lubrication of machines, replacement of worn parts, repair of breaks, modification of machines to changed production, supplying of power, steam, water, fuel, air, electricity, light, refrigerant, and other items necessary to machine or process function.

Sanitarian's Tasks

If this is an approximately true picture of a mechanical department doing its job, then the thought and energies of such a department are *not* focussed on floor maintenance, removal, disposal and salvage of wastes and refuse, painting of walls, ceilings, and facilities, the functioning and sanitary maintenance of personnel accommodations, such as toilets, showers, locker and lounge rooms, cafeterias, drinking fountains, uniforms, the guarding of the premises, preventing insect and rodent infestations, and protecting sensitive or perishable materials and products against soil and damage.

These latter functions make up a large part of sanitary maintenance and it only should be necessary to list them to make obvious their dissimilarity to mechanical maintenance. In aggregate, they constitute a control of the working environment rather than of the mechanical system. Maintaining the environment may be less important than mechanical maintenance but, in the long run, it is essential to it. Sanitary maintenance can be neglected or carried on at a low level, but only at the expense of quality production and of worker comfort and safety.

Maintenance of the environment also is concerned with careful job scheduling, time and motion studies, performance standards, and unit costs. These features, properly carried out, necessarily result in the up-grading of personnel from a collection of misfits and incompetents doing nondescript work into an orderly and semi-skilled group with differentiation of jobs and a level of efficiency, commanding better pay rates, and accompanied by a considerable lifting of personal dignity.

These desirable results only can come from specialized supervision working in a general management climate that recognizes and encourages efficiency and progress in every part of the organization.

Jobs of mechanical maintenance and plant sanitation being dissimilar, should there not be differentiation of supervision as well as of staff?

If a foreman is primarily concerned with making a record and getting pay increases because of the excellence of his machine maintenance program, is he likely to put very much thought or time into the methods and costs of floor maintenance, selection and use of insecticides, care of factory landscaping?

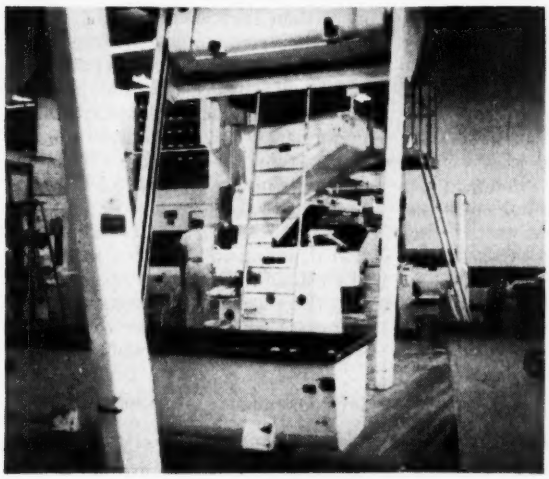
Can he be expected to put the same energy into operating a balanced sani-

How It Evolved

During the industrial revolution and coming down to the present highly mechanized society, there has been natural pre-occupation with machines, their performance, improvement, and maintenance. The engineering job of maintenance has, itself, slowly evolved from a haphazard detail of plant operation to a sharply differentiated, cost-accounted, and highly systematized part of plant endeavor.

In the historic background of this evolution, we can visualize the sooty, grimy, drab shops, poorly lighted and ventilated, in which laboring men spent long grinding hours with a minimum of comfort and safety.

While today some industries still are unavoidably drab and uninviting work places, yet in most present factories, machines now have been given the cleanest possible settings and employes the maximum of comfort compatible with their labors.—J.L.B.



Sanitarians "On Their Own" Prove the Key—

. . . DURING PRODUCTION: While dough trough is being dumped, worker (background) maintains plant cleanliness.

. . . FOLLOWING PRODUCTION: Trained personnel moves in for thorough and efficient cleaning of shutdown units.

tation program and selecting and training employees for this work as he would for his machine shop?

If your experiences with these factory situations have been similar to mine, the answer is—"No."

Then how about the superintendent of mechanical maintenance having a good man on his staff in charge of sanitary maintenance?

Again, in my experience, this does not work. In several large plants, where the person responsible for the sanitation program was a subordinate of the mechanical superintendent, he was not allowed the initiative and freedom necessary to run a successful program. He was cut off from a direct and essential relationship with the factory manager. And his authority in other departments and throughout the plant was little more than that of a mechanic.

Only upon making the man a sanitation foreman, directly responsible to the manager, was the general maintenance and sanitation of the plant able to go forward in the pattern of other plants where the job had long been at the departmental level.

This was no particular reflection on the mechanical superintendents involved. They were topnotch men in their specialties. But it was evidence that one important function cannot be subordinated to another without being crippled.

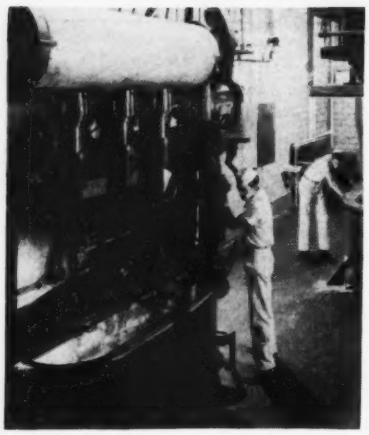
Fundamental in Foods

Up to this point, the plant visualized could be one in heavy industry where sanitation admittedly has a minor role. But when we consider the vast and varied food processing industry, sanitation becomes equal if not paramount to mechanical maintenance. Here, there come into play outside influences in support of sanitation, agencies enforcing laws and regulations pertaining to foods and drugs, and the competition in sales and advertising as to quality, safety, and consumer appeal.

In the area of sanitary maintenance, the food industry brings in necessities of machine cleaning, container and utensil washing, bacterial disinfection, and the protection of foods and organic materials against infestation and spoilage. Also, the personal hygiene and work habits of employees become of critical concern.

Consequently, differentiation of sanitation and mechanical maintenance becomes even more pronounced and the range of specialized knowledge required of the sanitation supervisor removes his work still further from the sphere of mechanical supervision.

For a long time it has been recog-



HINGED Plexiglas covering protects dough in trough during mixing.

nized that mechanical maintenance of a production machine was not, under most circumstances, a proper duty of its operator. Obviously, this is because the skillful running of a machine ordinarily doesn't give a person the knowledge and judgment necessary for its lubrication, adjustment, replacement of worn parts, or maintenance of its electrical appurtenances.

Of course, trade unions have made good use of this fact to confirm their exclusive privileges of maintenance—sometimes to the point of absurdity. However, separation of operating and mechanical maintenance functions is well established and no doubt is one of the basic factors contributing to the excellence of American mass production.

Cleaning Is Special, Too

If we accept this principle of separating operating and maintaining, how about its extension to machine cleaning? Is the operator, no matter how good, necessarily good at this? Again, many situations will come to mind where experienced operators, when assigned to cleanse production units after a working shift or on a weekend, will do only superficial jobs, wasteful of time and material, condoned perhaps by their departmental supervisors because the employees are of their own staff and otherwise satisfactory operators.

Point is that the sanitary maintenance of complex machine system is becoming, of necessity, a specialty in itself, to be delegated to another department whose function is service of a distinct kind.

The baking industry offers examples of this evolution. In the early days, there was good justification for operators—that is, bakers—doing their own clean-up. These tasks were simple and largely manual, and when the daily soil was removed from a few tables, containers, and the adjacent area, the routine job was done.

In modern bakeries, the beginning of a shift sees the pushing of buttons, which energize an elaborate system of relays and power circuits, in turn actuating valves, motors, fuel flow, conveyors, and the machines. At this moment there also begins a soiling of this system of conveyors and machines. This soil must be thoroughly removed at intervals, and in non-operating periods, or the machines cease to run. Who shall handle this clean-up—the men who have operated the units through the shifts, or a crew of skilled workers coming fresh onto the job, working under supervision, and within a department whose function is cleaning rather than production?

Separation Ups Production

My company operates one plant of recent design in which departmental cleaning, in addition to all other usual sanitation functions, is performed by the sanitation department. The staff that moves into the plant nightly consists of men who know precisely what their jobs are and who have the tools, materials, techniques, routines, and supervision necessary to work efficiently.

One consequence of this arrangement is that mechanical maintenance is able to do its part with less interference and complications because mechanics are working on clean machines and in clean areas. Significant result in this plant is less downtime and less loss of production than in any other similar company bakery.

Another interesting sidelight is that the operating departments demand and receive from the sanitation department a far higher level of accomplishment than they would get, or expect, from their own employees trying to do this same work. Since the departments are being charged for the cleaning service, their supervisors are critical of performance and want their money's worth—a highly satisfactory situation in maintaining a proper level of sanitation in a food plant.

In turn, an obligation of the production department is to do a maximum of cleaning incidental to operation, so that there are no unnecessary accumulations of soil or disorder to be dealt with by the sanitation staff.

Interdependence of Functions

While stress has been placed on the separation of functions, it also is proper to point out the interdependence of mechanical and sanitary maintenance. Where a positive sanitation program is operating (rather

than a rearguard action) the sanitation foreman or superintendent is carrying on a continuous sanitary inspection. This includes detection in structure, equipment, and machines of defects that impair the products or endanger the employees.

Correction of most of these defects will fall upon the mechanical maintenance department. Consequently, how good the sanitation status may be depends greatly on the skill, good judgment, and speed of the mechanical department in abating these defects.

This is particularly critical in food and similar plants where overlubrication may foul the machines and soil the products, where improper materials or corroded metal surfaces in product zones may have to be replaced, where modifications of processing machinery are improvised rather than carried out in a workmanlike manner, where safety guards are not replaced or are not provided in the first place, and where valves chronically leak and electrical wiring is left exposed.

The mechanical equipment that the sanitation department uses, or is directly responsible for, also requires mechanical maintenance. Here there may be mentioned floor machines, industrial vacuum systems, power scrubbers and sweepers, industrial washing machines, incinerators, lawn maintenance, and toilet fixtures and connections thereto.

In the writer's experience, about 55% of the recommendations routinely made as the result of food factory sanitary inspections requires the principal corrective action to be taken by the mechanical department. Needless to say, many of these would not be done if left to the initiative of that department, and if there is lacking the stimulus of a parallel department having an overall responsibility for order and cleanliness.

We already have commented on the fact that mechanics can do a better job on machines that are kept clean and not fouled by residual soils. Likewise, machine shop functioning itself is benefitted by the prodding of a sanitation department to keep stocks of parts in proper storage, idle machinery in order, and mechanics' working areas policed.

Foreign substances resulting from mechanics' work on and around processing machinery are another aspect of the problem wherein continual pressure from the outside is necessary to keep this important detail from getting out of hand.

One especially important function of sanitation supervision in food and similar plants is the evaluation of machinery and equipment in terms of sanitary design, fabrication, materials, and installation. This relates directly to the work of the mechanical department in its selection or approval of equipment for purchase and in the modification of machinery in plant use.

To ignore principles and features of sanitary design in planning or selecting machinery may involve the factory in costly routine cleaning and maintenance, as well as handicapping basic sanitation. When it comes to modifications, there are countless examples of the use of corrodible sheet metal and carbon steel in product zones where stainless steel ought to be employed:

Crude arc-welding all to often butchers an otherwise proper use of stainless steel. Surfaces and parts are made inaccessible where they ought to be easily reached for routine cleaning. Lubricated bearings and drives are placed in or over product zones, and non-moistureproof of electrical switches, starters, wiring, and motors are placed where they make cleaning either impossible or extremely difficult.

Who is to dissuade a mechanical department and acquiescent production departments from these wasteful errors if it isn't a competent and separate sanitation department?

Of course, outside enforcement agencies sometimes come in to point out the deficiencies. But for the one mistake listed as a violation, or the one machine condemned as unsanitary, there are thousands that continue, unchecked, in costly and inefficient use—when an intelligent sanitation point of view is not represented in the plant organization.

Occupational Hazards

Having explored the relationship between mechanical and sanitary maintenance, what of the relation of industrial sanitation to other essentials, such as health, industrial hygiene, and safety? Here, again, the importance and emphasis upon each varies with the industry. There are many ways in which these functions may be coordinated through top management, but it is still necessary at the performance level to have the functions differentiated and competently supervised.

The routine industrial medical service, dealing with pre-employment and periodic physical examination, and emergency illness and accident care, has no direct concern with sanitary maintenance.

As to safety, it is one of many elements making up the working environment, and it is necessarily dealt with in both sanitation and mechanical maintenance work even though responsibility for the safety program may lie in a separate department.

Within industrial concerns, a long-range safety program eventually reaches a stage where the arrears of physical modifications to establish safety are caught up with and put on a routine basis. Principal functions, other than inspection and maintenance, become the collection, analysis, and reporting of safety statistics, and the never-ending safety indoctrination of new and old employees, using every psychological stimulus possible to keep accidents down.

This highly specialized job is properly tied into personnel management and the industrial medical service. It is not, at the management level, a proper function of mechanical or sanitation supervision. But the physical maintenance essential to the control of occupational hazards is a responsibility necessarily shared by both departments.

For example, it is impossible to make a thorough sanitary inspection without recognizing the safety factors in a multitude of ways, such as the condition of the floors and stairways, adequacy of lighting, guarding of machinery, degrees of physical exertion, overhead working conditions (much of it having to do with sanitation personnel), and the hazards of electrical, steam, hot water, gas and heat exposures.

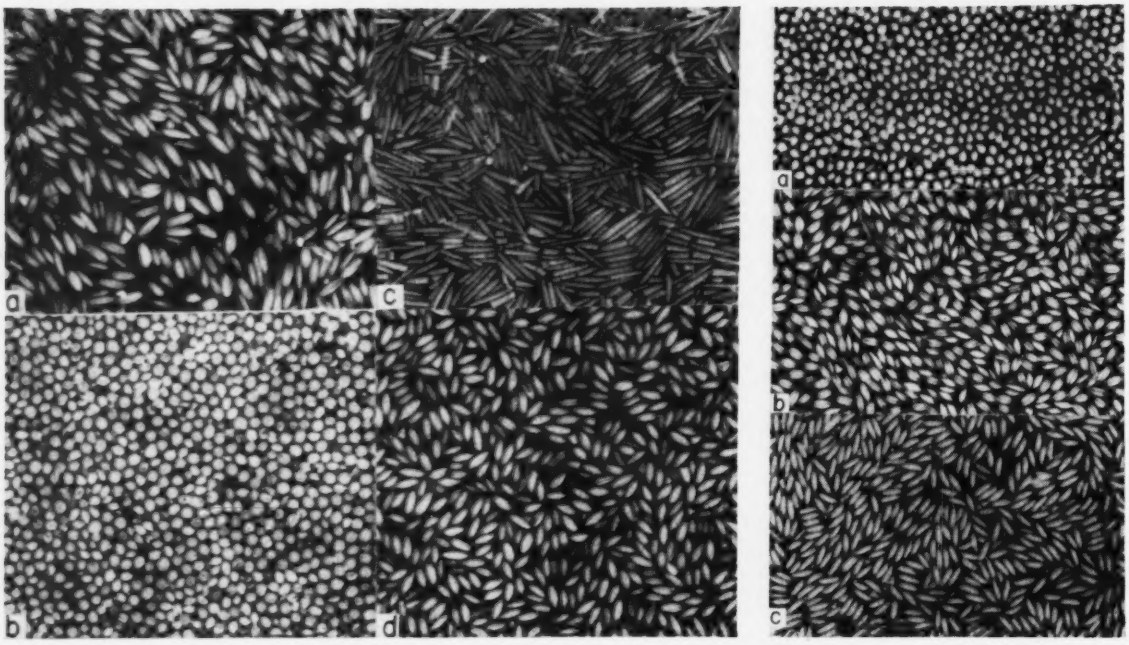
Correction of safety hazards is a routine part of the control of the working environment, whether it is a formal assignment or not. The sanitation supervisor is a key person on the safety committee.

In industrial operations where toxicological hazards or extremely unfavorable working conditions exist, services of industrial hygiene physicians and engineers are required either on the staff or as consultants. If such personnel are on the staff, there might well be direct coordination of work by placing both sanitary maintenance and the industrial health unit under common management.

However, where industrial hygiene service is not required, any operating connection between routine medical service and sanitation probably would hamper and circumscribe the sanitation program, because many of the sanitary maintenance functions would lie outside the interests of the medical director.

To reiterate the theme of this article, let it be said that sanitation is properly a concern of everyone but, as an industrial function, it must have specific, responsible supervision, independent of other jobs and other departments.

Above article is based upon an address by the author at the recent Plant Maintenance & Engineering Conference in Chicago.



RADIOGRAPHS reveal internal condition of various grains. Left photo: Oats with husks (a); grain sorghum (b); wild rice (c); and rye (d). Right photo: Buckwheat (a); barley (b); unmilled rice (c).

X-Rays Show *More than Insects*

Techniques developed for detection of infestation in stored grain now bid fair to play star roles in process control

M. J. ZUNICK and A. PACE
General Electric Co., X-ray Department, Milwaukee

New doors to food quality control have been opened by X-rays. Originally considered useful only for detection of insect infestation, the radiation has now proven equally valuable in other phases of the food field.

It may be used to seek out varied types of grain damage . . . to study granularity, germination, density variations and structural changes . . . and to grade seeds such as cocoa and coffee beans, and cottonseeds.

X-rays have been extended to the food field by such factors as: (1) Low voltage tubes that produce very soft, or low-penetration, rays; (2) the beryllium window that allows this soft radiation to exit from the tube; and (3) use of Mylar, a low-density plastic for lightproofing the film while allowing the soft rays to get through to the film.

Now that all this has been accomplished, a host of new uses are coming to the fore.

While several methods of detecting infestation of grain and seeds are available to millers and elevator operators, evaluations are in order relative to their effectiveness under the pertinent conditions.

You may (1) make a visual examination; (2) carry out an acid fuchsin test; (3) employ cracking-flotation, or (4) use X-ray.

Fact is that the latter two tests have been used with most success.

The cracking-flotation method requires grinding of the sample, boiling it in water, decanting off the top, allowing residue to settle, decanting with oil again, digesting starch and wheat residue with HCl, and examining the residue microscopically for insect fragments.

In the X-ray method, grain or seeds are placed on a tray of the special apparatus and a film is inserted in the cover of the unit. Closing the cover protects operator from radiation, and a toggle switch initiates the X-ray exposure.

Average exposure is ½-1½ min. Film is then developed in standard processing solutions. Image can be viewed on wet film within 6 min. after exposure, but a more detailed examination can be made after washing and drying, which generally requires 20-30 min. Experience has indicated that 10-12 examinations can be made per hour.

Has Other Applications

Greatest benefit of the X-ray method has been in detection of internal infestation of grains. (See "X-Rays Spur Infestation Control," FE Sept. '52, p. 75).

However, there are a number of interesting characteristics of the image, since the X-ray beam penetrates the grain and reveals internal conditions that cannot be detected with other methods.

Grains that have not been stored properly can be detected by the cracking or fissuring that occurs. This condition is not visible from the surface even though the grain is severely checked. Checking and other physical changes as the result of various processing procedures can be recorded

and used as a control means for such processing.

Our lead photographs show radiographs of seven grains and visualize granularity, foreign material, size and shape of grains, breakage, checking, etc. Note particularly section (b) in the right photo, where extreme checking, probably resulting from poor storage, is quite obvious.

Extent of swelling of rice during different stages of cooking is shown in Fig. 1. Texture and density of bread also can be studied. An example of this is given in Fig. 2.

The X-Ray Equipment

But now let us examine the X-ray machine.

Grain is a relatively low density material and its successful radiography requires low voltage, long wave-length radiation. Low voltage X-ray equipment generating long wave-length radiations were available when, in 1949-50, studies at Kansas State College[1,2] showed that radiography could be used successfully for routine inspection of grain.

However, its high cost, and other problems related to adapting this equipment, designed for other specific uses, precluded its application for inspection of grain.

Development work, started by General Electric Co. in 1951, resulted in design of a special unit for grain inspection (see Fig. 3).

The commercial apparatus announced in 1952 (Fig. 4) has a self-contained, shockproof X-ray generator that is operated from a standard 110 v., 60-cycle outlet. It is rated at 10-25 kv. peak and 5 milliamperes. Controls, sample holder, and film cassette are located at top of cabinet (35 in. from floor). This makes for convenience, ease of operation, and rapid exposure of grain or seed samples.

A thin Be (beryllium) window X-ray tube (Fig. 5) was specifically developed for this unit. Window diameter is large enough so that at a distance of 28-in. a standard 14 x 17 inch. X-ray film is practically covered. This permits radiography of a large number of samples with each exposure, thus saving time and cutting film cost.

Tube is capable of maintaining X-ray intensity over required area within 10% of the central beam. The 28-in. fixed distance insures excellent radiography detail and eliminates varying exposure factor because of changes in distance.

Conventional paper film holders

(*Turn to page 139*)

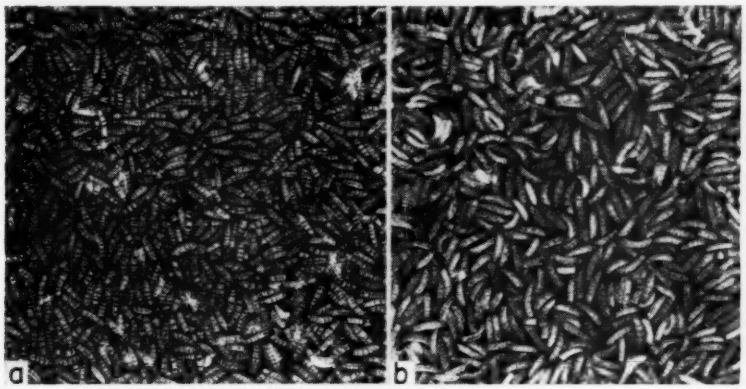


FIG. 1. RADIOGRAPHS follow changes that take place during cooking of rice. Early stages of pre-cooking (a), more advanced stage (b).

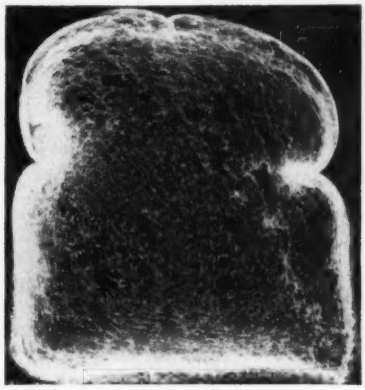


FIG. 2. LOW-VOLTAGE X-ray photograph of slice of white bread.

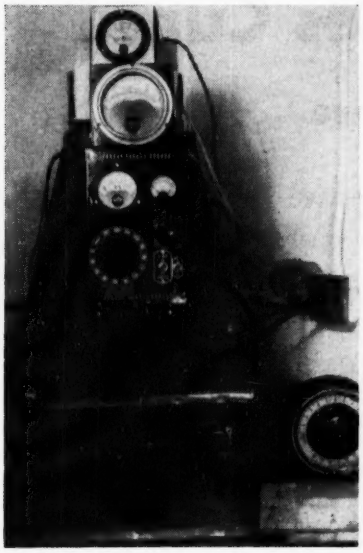


FIG. 3. ORIGINAL X-ray unit comprised box with sliding door for insertion of grain and film.

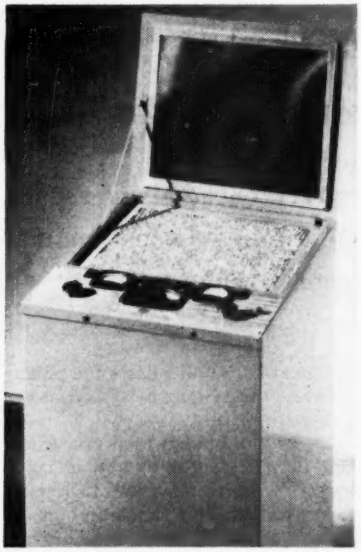
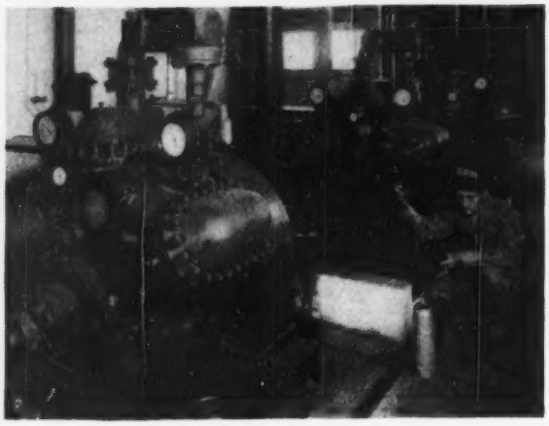


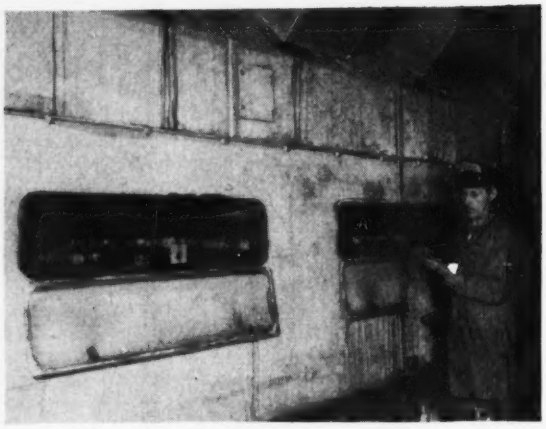
FIG. 4. NEW unit is 35 in. high. It has hinged cover holding film and easily accessible grain tray.

FIG. 5. THIS special X-ray tube with thin beryllium window, enables maximum use of 14x17 in. film.

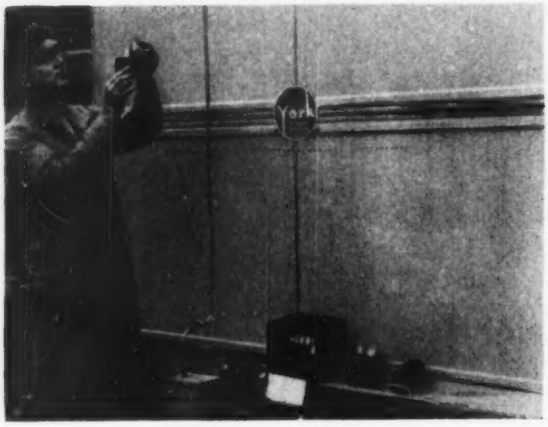
"PM" Is Fast-Acting Prescription In—



. . . Testing for ammonia leaks



. . . Inspecting spray nozzles



. . . Checking cooling water

. . . Cleaning air filters

Refrigeration Headaches Cured

By Preventive Maintenance

Whether bought on contract or administered by service group within plant, it will increase life of equipment, minimize operating and replacement costs, and give maximum capacity with minimum downtime

W. R. LAUT
Industrial Engineer, York Corp., Detroit

As old as machinery itself is the practice of taking special steps to maintain it. Often, the problem has been to make sure these steps are real strides.

Unfortunately, most of us visualize refrigeration maintenance as a combination of an oil can, grease gun, ammonia odors—and a desperate phone call when the system breaks down on the Fourth of July.

Yet, as the modern food processing plant becomes larger and more complex, it is more important than ever to put haphazard refrigeration maintenance methods behind us. This can be accomplished by actually scheduling maintenance on a systematic, business-like basis—which will go a long way toward reducing total maintenance costs. In addition, it will achieve rated refrigeration capacity over the years with a minimum of down time.

How to Proceed

The sensible approach to such a system lies in carefully planning a program and faithfully administering

it. And it is this approach that I like to think of as "Preventive Maintenance."

Our goal with this program is actually threefold: (1) To get the longest life out of the equipment; (2) to operate the system with a minimum cost of utilities, renewal parts, labor and material; and (3) to have the system operate when it is required, with an absolute minimum of downtime.

The first two goals, long life and minimum operating expense, are self explanatory. The third, minimum downtime, is far reaching.

Effects of a breakdown during peak operation can be so costly that the eventual result cannot be calculated. Such things as limited production, perishable product, loss of production labor, or even complete stoppage of production, can result in an immediate loss of profit.

Proper Application

But in some cases the far-reaching effect of an inferior product, even when the product is inferior for only a short period, can and will be loss of customers and future business. With these thoughts in mind, let us examine the possibility of improving maintenance by applying preventive maintenance.

A preventive program should be applied through intelligent, systematic, and regular effort. The program should be carried out in line with the following tenets:

1. Inspection at regular intervals, regardless of apparent need of attention.

2. Inspection in a systematic manner, with each component of system receiving thorough attention.

3. Work by competent personnel trained to analyze performance and make necessary repairs.

4. Thorough supervision, enabling the maintenance engineer to see that the work is faithfully administered in accordance with prescribed rules.

Basically, there are two ways to administer such a system. The first is quite simple. It consists of contract inspections performed by a commercial refrigeration concern. This service is made available to plant management by concerns that have built competent service organizations. They will provide complete plans for any plant.

Checks by Specialists

The conditions prescribed will call for a specified number of complete inspections each year, made by refrigeration specialists. Included is a contingency that covers renewal for all system components—compressors, condensers, controls, valves, motors, pumps, etc. This accounts for both material and labor. So this contract takes on the aspect of a life insurance program for the entire system.

The entire program can be obtained for a fixed yearly contract price determined from actuarial tables. These consider such items as size of plant, compressor sizes, number of inspections to be made each year, complexity of system, location of plant, and age of equipment. A typical contract service form is illustrated.

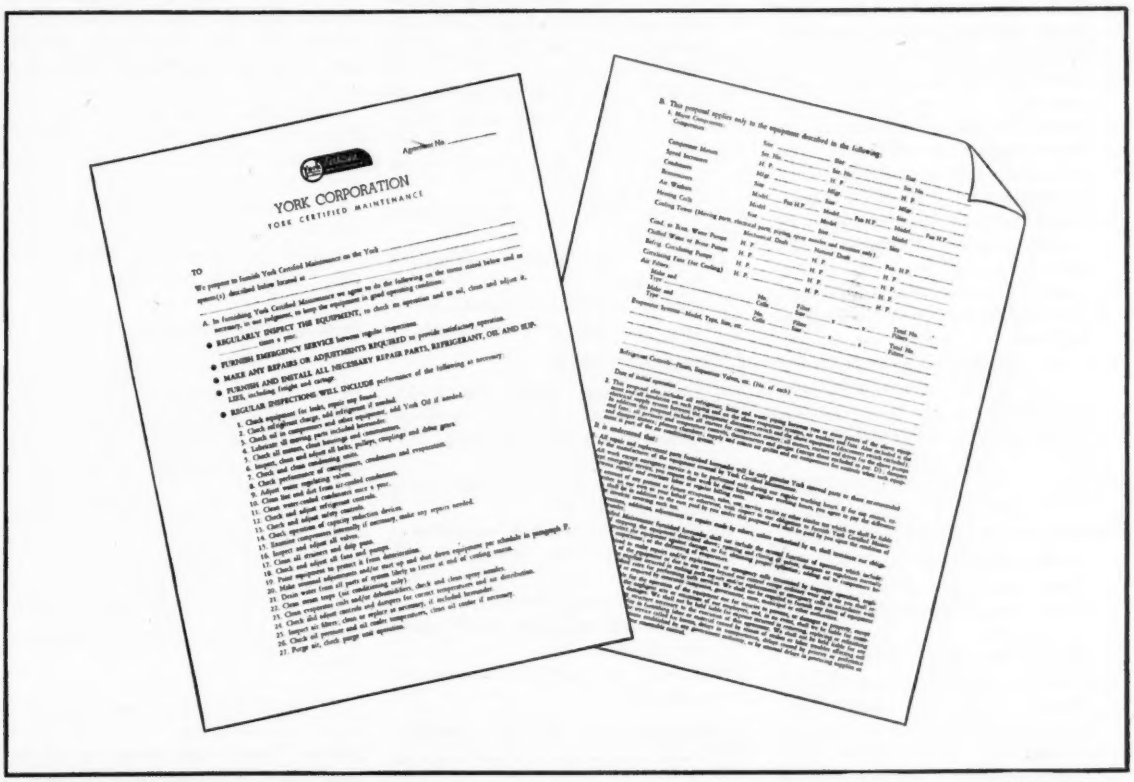
This method of applying preventive maintenance to a plant is gaining in favor; since it eliminates many problems for management in building a sound service program. In some cases it abolishes one or more engineers, or it frees them for other plant work.

Also, it allows management to budget exactly the cost of yearly refrigeration maintenance without any guesswork and does away with any problem of obtaining and training engineers for this work.

In-Plant Service

The second method lies in building a service group around the plant operating engineer. Some managements prefer to handle it in this way. They feel that the operating engineer can dovetail maintenance into his regular plant duties.

This is feasible. And a sound pro-


YORK CORPORATION

YORK CERTIFIED MAINTENANCE

KEY PORTIONS of typical contract service form covering regular inspection and maintenance of refrigeration.

gram can be pursued, provided the engineer is experienced and well trained, is supported by adequate help when required, and has a prescribed program that he will be able to follow faithfully.

However, let's be frank with ourselves: If the operating engineer is expected to keep a modern, complex plant operating in addition to such things as handling new installation work, building construction, repair work, and the thousand and one things that must be done by the engineer, then the refrigeration preventive maintenance program will suffer. Only by providing the engineer with adequate help, so that thorough inspection and service can be performed, will the program succeed.

Checklist Suggested

Regardless of the method employed, it should include a complete inspection of the entire system at least once each month. This checkup should encompass a close and thorough look at each component. A checklist (see panel) should be prepared and printed forms of it made available to guide the engineer so that each item will receive proper attention at the time of inspection.

This list is not intended to be complete for any one plant, since each will have special equipment requiring separate tabulation or variations in procedure. Important point is to prepare a list for your plant and to faithfully follow it with care.

Immediately after each inspection the checklist should be completed by adding comments on condition of system and also suggestions for improving the present inspection plan. This latter is especially important if it is found that more time, material, or expense is being required than is normally allowed for routine maintenance.

Filed Permanently

The list then should be presented to management, or the individual in charge of plant maintenance, for review. Action should be taken on repairing items reported. And an analysis should be made of operating conditions, since these will forewarn of operating difficulties ahead. Inspection reports should be kept in a permanent file.

Plant maintenance will be aided greatly if care is exercised in installation of new equipment. Before it is installed, the vendor should be requested to give suggestions in connection with piping, location, control, layout, and the like, so that minor details can be incorporated in the system at the time the installation is made.

Such details as bypasses around control valves and strainers, pressure gages and thermometer wells in piping so that equipment performance can be determined, and dual relief valves in place of the usually inadequate single relief ones make equipment maintenance easier.

Standby Units Help

The refrigeration engineer should be allowed to suggest equipment that will permit building into the system some form of standby capacity. Examples are two small condensers in place of one large one, adequate piping sizes for future additions, sufficient stop valves in the system for cutovers and pump downs.

These relatively small items will more than repay their initial cost in providing a more efficient system and one that is easier to maintain.

Above feature is from a talk "Preventive Maintenance of Refrigeration Systems," presented at the Second Annual Dairy Engineering Conference, Michigan State College, Mar. 3, 1954.

Refrigeration Checklist

DATE_____

1. COMPRESSORS

- **a. Check stuffing box for leaks or overtightness of packing gland.**
- **b. Check oil level. Add oil if necessary. Record in "Oil Log."**
- **c. Check jacket water to and from compressor: In ___°F.; Out ___°F.**
- **d. Check discharge gas temperature: ___°F.**
- **e. Check suction gas temperature: ___°F.**
- **f. Refrigerant pressures: Suction ___psi.; Discharge ___psi.**
- **g. Check operation of safety control (high and low pressure cutouts, oil switch).**
- **h. Check V-belt drives and belt guards.**
- **i. Lubricate motors, if required.**
- **j. Check operation of hand stop valves in machine. Repack and lubricate stems where required.**
- **k. Check voltage and current to compressors: ___Volts; ___ amps.**
- **l. Touch up paint where required.**
- **m. Check piping, valves, and fittings for leaks.**
- **n. Check compressor manifolds for leaking relief valves and leaking stop valves.**
- **o. Drain oil traps. Record in "Oil Log."**
- **p. Check auxiliary equipment: Traps, pumps, etc.**

2. CONDENSERS (SHELL AND TUBE) AND RECEIVER

- **a. Check settings of all hand valves.**
- **b. Check water temperatures: In ___°F.; Out ___°F.**
- **c. Check relief valves for leaks.**
- **d. Check discharge water for leaks.**
- **e. Check refrigerant level. Add refrigerant if required. Record in Log.**
- **f. Check condenser water regulator and clean strainer.**
- **g. Check for proper drainage of condenser.**
- **h. Purge air from condensers and receiver.**

3. EVAPORATORS (S. W. COOLERS, COILS, AIR UNITS, ICE BUILDERS, SURFACE COOLERS, ETC.)

- **a. Drain oil from each evaporator. Record in Log.**
- **b. Lubricate all motors and bearings as required.**
- **c. Check operation of all hand stop valves. Repair as required.**
- **d. Check and record temperatures in all storage rooms. Check temperatures of sweet water, etc.**
- **e. Check and record suction pressure at each evaporator.**
- **f. Check and record temperature of suction gas leaving each evaporator. Adjust liquid control valve as required.**
- **g. Check operation of all liquid control valves, solenoids, pressure regulators, etc. Clean all strainers. Renew float seats every 6 months.**
- **h. Check condition of evaporator surfaces.**
- **i. Check surge drum relief valves for leaks.**
- **j. Check condition of V-belt drives and location of belt guards.**

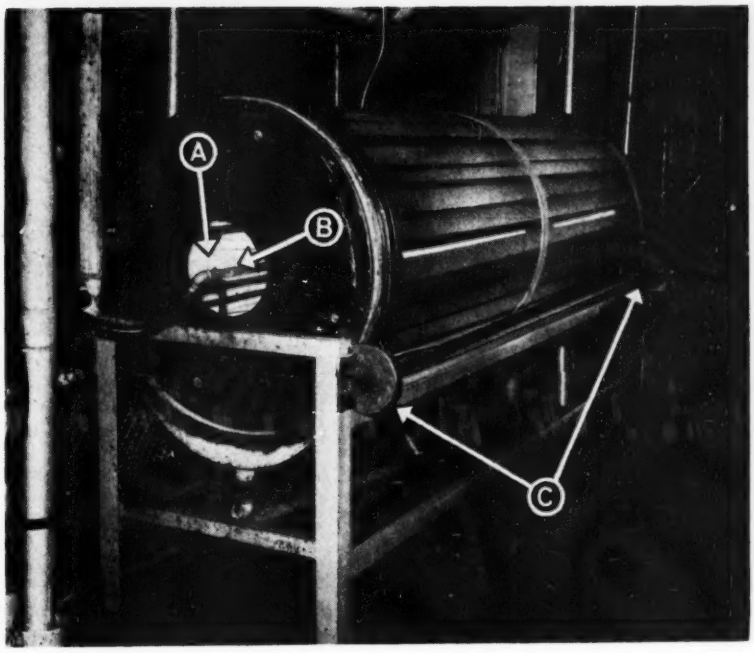
4. MISCELLANEOUS

- **a. Check plant piping for leaks. Repack stop valves as required.**
- **b. Check sweet water pumps, piping, and controls.**
- **c. Check pipe covering and repair as required.**
- **d. Clean water-cooled condensers once each year, or sooner if required.**
- **e. Examine compressors internally once each year and renew parts as required.**
- **f. Touch up painting where required.**

COMMENTS ON PLANT INSPECTION:_____

_____

_____



PILOT-PLANT MODEL of dewatering reel handles 1,000-lb. batches of gel. Unit is built of staves from redwood tank to form 3x10-ft. barrel, which is lined with cotton cloth (A). Water is played on gel from pipe (B). Barrel is rotated by pair of single-flanged wheels (C) on shaft.

THIS NEW REEL→ —was specifically designed to remove water from difficult-to-handle pectin gels. Featuring gentle working of material that increases dewatering rate, it is seen solving other water-removal problems... unit can be used batchwise or continuously

Dewaters Pectin Gels

R. P. GRAHAM and A. D. SHEPHERD

Western Utilization Research Branch, Agricultural Research Service, USDA, Albany, Calif.

During development of a process in pilot-plant scale for making low-methoxyl pectin from citrus peel,* practical procedures were called for in order to dewater 1,000-lb. batches of gel containing 0.5-2.0% solids.

Gels could not be dewatered by pressing at such solids content, except at impractically low rates. Consequently, a reel was devised for dewatering the gels.

▶ **Possibility of using this reel to solve other dewatering problems should not be overlooked.**

Low-methoxyl-pectin gels encountered in our work synergized readily. However, liquid released did not drain freely from the mass.

Observation of the gel standing in a container or supported on a draining cloth showed separation of small pockets of liquid due to syneresis—but little tendency for the pockets to drain. Failure to remove these pockets interferred with further syneresis.

Working with small batches in the laboratory, we obtained satisfactory dewatering when the gel was placed on a cloth supported by a beaker and then occasionally stirred to facilitate draining of the liquid pockets. Dewatering was speeded considerably when the gel was enclosed in the cloth and gently worked by hand. Attainment of practical dewatering rates depended, therefore, upon the continual working and draining of the gel.

In the development of our mechanized dewatering device, tests were made on small reels. One lined with wire cloth was unsatisfactory because the gel worked through the mesh. A tight cloth-lined reel fitted with lifters proved feasible. And a loose cloth-lined reel more nearly simulated the desired hand-working action.

Further experimentation showed that the solids content of the gel could be increased to a higher level in a loose cloth-lined rather than a tight cloth-lined reel. Performance of the loose cloth-lined reel in dewatering large laboratory batches of gel was so good that a unit was built to handle 1,000-lb. batches.

The barrel (3 x 10 ft.) of this pilot-plant reel was made from staves of a redwood tank, spaced to allow drainage of fluid between the staves. At eight points around the circumference were attached lifters projecting toward the center. Each of these was 3½ in. high and extended the full length of the barrel.

A plain-weave cotton cloth, resembling heavy burlap in fabric structure, served as a lining. It was laid to conform to the internal contour of the barrel, and it was secured only on the tops of the lifters and at both ends.

The barrel was rotated by a pair of single-flanged wheels on a longitudinal shaft. Rotational speed of the barrel was variable—from ¼ to 1 rpm.

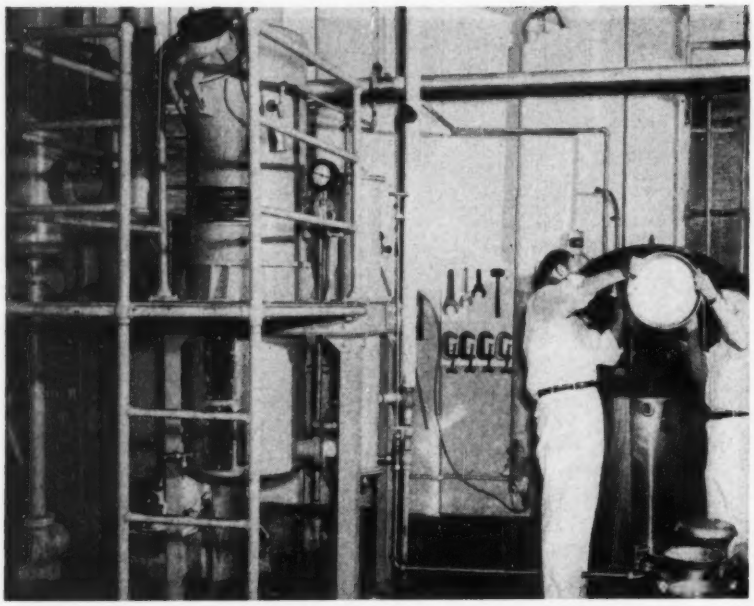
Ends of the barrel were partially closed by wooden rings. The ring at the feed end was fixed, whereas the ring at the discharge end was removable to facilitate unloading of gel. Gel is washed by water running through a pipe drilled with a row of small holes. This pipe is placed at the axis of the barrel.

Operating the Reel

In pilot-plant use, the reel was operated batch-wise. Acid-precipitated, low-methoxyl-pectin gel (pH 1.5 or lower) was discharged from an overhead tank, through a stainless steel pipe, and into the reel.

(*Turn to page* 170)

* Graham, R. P. and Sheperd, A. D., "Pilot-Plant Production of Low-Methoxyl Pectin From Citrus Peel," *J. Agr. & Food Chem.*, 1(16), 993, 1953.



SAP is heated to 180 deg. F. in steam-jacketed hot well (right), then concentrated to desired Baume in single-effect vacuum pan (left).

SYRUP is finished off to 65½% sugar in open, steam heated kettle.

Full-Flavored Maple Syrup Process

Puts Idle Dairy Units to Work

Scheme that keeps equipment in operation during off-season features concentration of sap in vacuum evaporator, followed by open kettle boiling that assures popular color and quality.

W. K. JORDAN, F. V. KOSIKOWSKI and R. P. MARCH

Department of Dairy Industry, Cornell University, Ithaca, N. Y.

Maple syrup with flavor comparable to that of the open-kettle product can be made economically on standard dairy processing equipment. —*Which is a pertinent idea considering the fact that these units are little used during the sap season.*

What's more, many of the groves in maple producing areas are on dairy farms delivering milk to processing plants. Thus, application of this method should mutually benefit both farmer and dairy processor.

Sap Lacks Maple Flavor

As it comes from the tree, sap of the sugar maple is a clear liquid containing 2-3% sugar. It is slightly sweet to the taste but has no maple flavor. Subsequent heating during processing develops the typical flavor.

That this heating is necessary has been proved by Willits *et al*,* who concentrated sap by freeze-drying and found no flavor other than sweetness in the concentrate.

Tests in Wisconsin with a milk evaporator also gave disappointing results. The concentrated syrup had a light color and low flavor intensity. These experiments suggested that some means of concentrating by mild heat should be satisfactory if followed by a special heat treatment to develop desired flavor.

With this in mind, a project was set up at the Department of Dairy Industry, Cornell University, to make maple syrup by concentrating in a small milk evaporator.

Other Dairy Units

To carry out the tests, about 40 trees located along a paved road about 5 miles from Ithaca were selected. Trees were tapped in the usual manner in the latter part of Feb. 1953, and sap was collected as necessary until the end of the season, which came in the latter part of March.

In addition to centering the experiment around use of the vacuum pan, an attempt was made to use as much other dairy equipment and as many milk handling methods as possible. Ordinary spiles were placed in each of the tap holes, and sap was collected in used single-service 50-lb. cottage cheese tins or 50-lb. chocolate syrup pails. Since these were disposable pails, satisfactory collection buckets were obtained at no cost. The tinned covers

*Willits, C. O. and Porter, W. L. *"Maple Syrup II. A New High-Flavored Maple Syrup."* USDA (ERRL) AIC—269, 1950.

were notched to take the spiles, and the problem of leakers in the cottage cheese tins was solved by filling the inside seams of these cans with melted cheese wax.

Experimental Techniques

On collection days, sap was transferred from buckets to 40-qt. milk cans and hauled to the dairy. Filtering was done at the collection point by passing the sap through a farm-type milk filter pad as it was transferred to the cans.

The sap was stored at 40 deg. F. until enough had been collected to make the operation of the vacuum pan worth while. A total of about 2,000 gal. of sap was collected and processed during the course of the experiment.

The pan, a model 2-1, single-effect Buflovak evaporator, removed about 450 lb. of water per hour and required at least 20 gal. for finishing. It was operated batchwise during the tests. Since 20 gal. of concentrated syrup represents about 800 gal. of sap, or operation of the pan for about 13 hr., it was found more desirable to partially concentrate smaller batches, store these in milk cans, and then combine these batches and finish them off later.

Sap was handled in much the same way as milk. It was dumped into the steam-jacketed hot well, forewarmed to about 180 deg. F., held for 10 min., and then drawn into the pan.

No Foaming Problem

Operation of the pan was readily pushed to its full capacity because no problem of foaming was experienced. This is in marked contrast to the foaming accompanying boiling of milk.

Concentration was carried to 65.5% sugar in the final product. This was checked with a Baume hydrometer. At 68 deg. F. the Baume reading for 65.5% maple syrup is 35.3.

Quality of Maple Syrup

As was expected, the first batch, in which the final concentration of 65.5% was reached in the pan, was light in color and low in flavor. This product was scored as high quality by a number of experienced judges. However, consumers who have become used to the flavor of maple syrup made by open kettle boiling generally preferred a stronger flavor.

In an attempt to bring out more flavor, three processing methods were tried.

1. A high-flavoring process—boiling 90% syrup with a reflex condenser for 2 hr. at 250 deg. F. This method intensifies the maple flavor 4 to 6 times. Devised by Willits and Porter of Eastern Regional Research Laboratory, it calls for dilution of the high flavored syrup to give a mixture of 15% maple syrup and 85% cane sugar syrup. Thus, the product was given a pleasing maple flavor and color.

2. Boiling some of the pan concentrate in an open kettle for about ½ hr. while adding water periodically to maintain a constant solids content. Product treated in this way was also scored as high quality.

3. Concentrating the sap to about 45% solids in the pan and finishing it off to 65.5% in an open, steam-heated kettle. This product was judged to have the most desirable flavor and, in this project, the method was most satisfactory.

Removal of Sediment

Characteristic sediment of open-kettle maple syrup was obtained when the pan-concentrated syrups were given additional heat treatments. The fine particles making up this sediment were not effectively removed by a small milk clarifier because they quickly filled the bowl. Allowing the material to settle and drawing off the clear syrup above proved the most feasible way. Perhaps larger milk clarifiers normally found in dairies, or automatic desludging clarifiers used in continuous butter making plants would prove satisfactory in further trials.

Finished syrup was packaged hot in clean gallon jugs that had been used for ice cream flavoring material and orangeade concentrate.

Measurement of Sugar

Since the sugar content of sap varies, some means of determining the relative value of a given batch of sap is needed. These measurements can be done simply with a hand refractometer. This instrument can be obtained with a scale calibrated to read directly in percentage of sugar. It is dipped into a representative composite sample of the sap and the sugar content is noted on the scale of the refractometer.

Processing Costs

Direct comparison of the costs of evaporating water in a typical open kettle sap evaporator and in a milk evaporator is difficult to make because of the lack of published information on the latter. Phillips and Homiller* give an approximate labor and fuel cost of 0.2¢ per lb. of water evaporated in the open kettle. Cost in the milk evaporator is probably slightly higher. Answers to these questions can be obtained only by trial operations on a commercial scale.

As stated, other advantages are inherent in this system. Concentrating sap would provide a means of keeping

(Turn to page 179)

*Phillips, G. W. M. and Homiller, R. P. *Oil Firing for the Maple Syrup Evaporator.* USDA (ERRL) AIC—358, 1953.

SINGLE SERVICE cottage cheese tins are used to collect sap as it flows from tapped trees. These are emptied into milk cans on collection days.

SPEEDY PACKING. Two wrapping machines (left photo) feed mints onto transverse conveyor, from which they are packed into 3-lb. paperboard tubs. Right photo: Assorted chocolates are packed into belt-conveyed boxes.

Gains 15 Ways by Modernizing

Southern confectioner streamlines process flow with well-engineered methods. Improves products and slashes costs with advanced air conditioning, forming, mixing, scaling, formulating, packaging, job training, and working conditions

E. DALTON WHITE
FE Correspondent, Atlanta, Ga.

Three steps—plant modernization, installation of advanced equipment, and adoption of new processing techniques—were taken by Fine Products Co., Augusta, Ga., to cut costs, increase efficiency, gain new product uniformity, and improve quality.

All told, these steps added up to 15 specific improvements at this confectionery firm.

The plant-improvement program was preceded by careful engineering and production-trial studies. From ingredient storage, through batching and processing, and to final shipment, the design change aimed at making handling of materials as automatic as possible in a multistory building. Accordingly, processing lines also were rearranged for continuous flow, further reducing handling of materials.

Since, in addition, eye-appealing packages play a top-important role, improved manufacturing techniques were called for to assure continued progress. These now are repaying the company in efficiencies and economies that offset the rising costs of materials and labor.

The physical improvements—installing latest equipment, mechanizing operations, and changing production lines—were accomplished without disrupting processing. Changes were spaced and fitted to reflect benefits as they were made. At the same time, coordination was necessary to prevent bottlenecks in storage or shipping. The revisions were made gradually over a period of months, with details always worked out to prevent interruptions.

Getting Down to Details

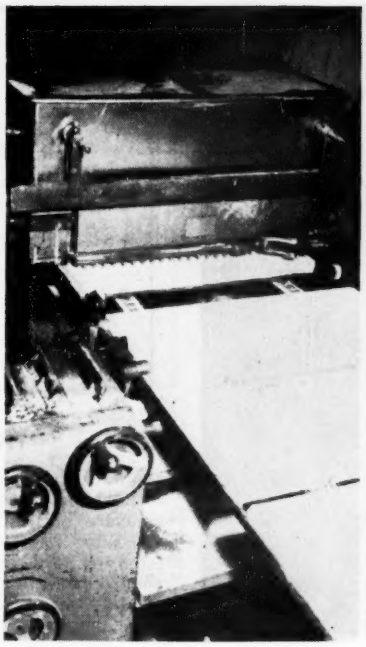
Here are terse briefs of FPC's 15 significant modernization strides:

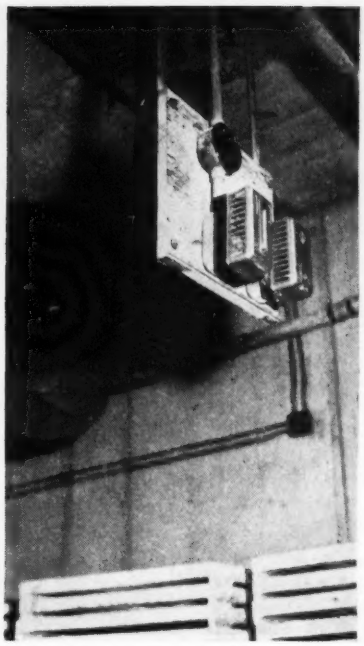
1 About one-third of the roof space was saved by replacing older cooling equipment with a new type York cooling tower (with nozzle sprays). This new system permits recirculation of water, and thus decidedly improves operations.

2 Peaks and valleys in hard candy-production schedules have been eliminated, and sufficient inventory is built up to meet rush season demands, through installation of an automatic air conditioning system in the processing and storage rooms.

3 Problem of chipping of ends of cut hard candies has been licked by redesigning the conveyor system for gentler handling. Stopped is former breakage caused by pieces of candy colliding or dropping from the conveyor onto hard surfaces.

4 Production efficiency has been "upped," and more uniformity obtained in the chocolate-covered creams and nuts, by air conditioning all areas other than batching and cooking and by putting in new equipment. A new National depositor eliminated varia-





OTHER EFFICIENCIES. "Imperfects" have been curbed (left photo) by training. Center: By checking machine settings, uniform cream centers are assured. Right: Air conditioning "levels" production.

tion in the amount of cream centers.

Advantages of Formula Change

5 Easier-to-handle cream centers—ones that better retain their shapes and withstand brushing and screening during starch-cleaning operation – have been formulated. Resulting are firm, crystalline surfaces that are better coated with chocolate. Consistency is varied for each type of center to meet flavor and texture requirements. Formulas have been worked out so that creams flow evenly to fill molds with controlled uniformity.

6 Ageing of molded cream centers (12-24 hr.) has been improved with utilization of an automatically controlled conditioning room kept at 72 deg. F. and 35-40% humidity. Capacity of the room is 12,000 lb.

7 Imperfect and rejected cream centers are assembled, then remelted to make a batch of fudge or second line of candies. Nuts, too, are reclaimed, reused. Closer supervision and training in the method of placing nuts in starch molds has reduced number of rejects.

8 A Berks mixer has been installed to reduce mixing time, obtain greater uniformity in the mix of flavor, and control temperature of the batch for the next process.

9 For accuracy and speed, all flavors are scaled in 1, 2, and 3-oz. plastic bottles in the testing laboratory. This system has eliminated time lost in measuring flavors for each batch.

10 A system has been worked out by the testing lab for accurately controlling the quality, piece-size, and weight of candies—a step of utmost importance in packing variety-box candies. Unless each piece in each variety and flavor is of proper measurement, it will not fit snugly in the box, and variations in total box weight result.

Now, however, every batch of centers is checked for texture, flavor, uniformity, weight, and size. And machine settings are carefully and periodically inspected, with changes made immediately when tests show deviations from standards.

It became necessary to design and construct machines to assure full advantage of the new production techniques. This was especially true in the case of a machine for individual wrapping of pure sugar mint lumps in transparent cellophane.

11 Due to growing popularity of chocolate-covered mints, FPC sales of this product have greatly increased. To meet the demand, streamlined packaging system was developed. It involved installation of two foil-wrapping machines that feed mints onto a common conveyor, from which they are packed 240 pieces (3 lb.) to a paper-tub container. Required are only three operators—one on each wrapping machine and one to pack the foil-wrapped mints in the tubs.

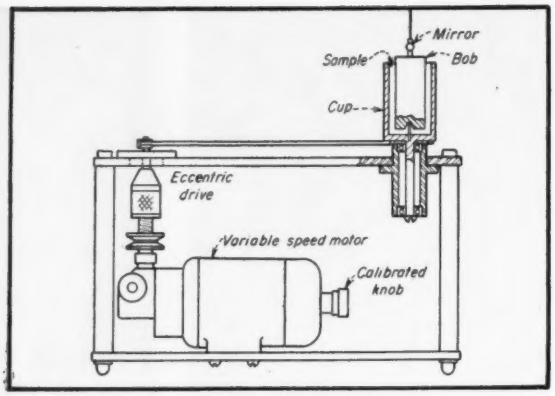
12 By twin-packaging lollypops, sales were decidedly boosted. At first, lollypops were individually wrapped, then two of the same kind were taped together. The sales jump came, however, when two different flavors were hand-wrapped in one package, which was heat-sealed by hand.

13 To meet its varied requirements for packages, the company now has its own printing and box-making operations. Today, design changes can be made rapidly and materials turned out in quantity to meet seasonal demands. Economy and efficiency of operation are notable in this system.

14 Although many mechanical improvements have been made to meet increased production schedules, working conditions of employees have not been overlooked. The company feels that such employee policies form a responsibility of management.

Mechanization has reduced workloads and air conditioning has provided comfort for workers. Also a new loudspeaker system helps.

15 Even with all this the company feels that its efficient operations could not be fully realized without adequate employe training in each job. As a result of its well-planned training program, lost motion has been reduced and work is more continuous and uniform. Bottlenecks at any specific station, with resultant slow-downs at other points along the production line, have been curbed.



THE INSTRUMENT . . .

Operated here by Dr. Robert P. Joslin, Monsanto food technologist, "resonance elastometer," was contrived to measure elastic properties of foodstuffs independent of viscosity. Sample is placed in cup, which is motor-oscillated. By adjusting motor speed, maximum turn of bob suspended in sample is registered on wall through swinging hairline image from light-beam reflecting system. Swing is direct index of elasticity. Drawing (above) shows scheme.

RHEOLOGY OPENS

LLOYD E. SLATER
Associate Editor, "Food Engineering"

New probing of foodstuffs suggests more objective measurements revealing vital knowledge of behavior in process—as attested in pioneer studies by Monsanto researchers with a unique rheological device

Exciting developments in improved ingredients, better processes and, thus, finer foods, should soon materialize as "rheology-minded" researchers train their revealing science on various products.

Actually, rheology—which can be defined as study of the deformation and flow of matter—is not new to the food field. The many tests developed in the past 20 years for such qualities as viscosity, consistency, plasticity, fluidity, etc., are essentially rheological measurements.

However, most of these tests were conceived for specific products and are expressed in arbitrary units. In short, they have been aimed at "reference-point" control as an end in itself and do not interrelate products nor provide inklings as to why foods flow as they do.

▶Today's approach concerns itself with the "why" of product behavior. Using rheology as a basic scientific tool, researchers are discovering not only more realistic measurements related to food quality, but also the reasons why fluid and plastic foods behave as they do in process and, perhaps, in the mouths of the consumers.

A food technology group pioneering this intriguing field at Monsanto Chemical's Inorganic Division, Dayton, Ohio, recently came up with a fundamental instrument design that should do much to further food rheology. They call this a "resonance elastometer"—a means of measuring elasticity in foods independent of viscosity.

Early studies with the resonance elastometer, chiefly on bakery doughs and batters, have already yielded valuable data on performance of ingredients and suggested possible new manipulative procedures in baking.

However, for proper description of the working principle of the new instrument and the meaning of some of the information thus being developed, it is pertinent first to review certain basic principles of rheology, with particular orientation to foodstuffs.

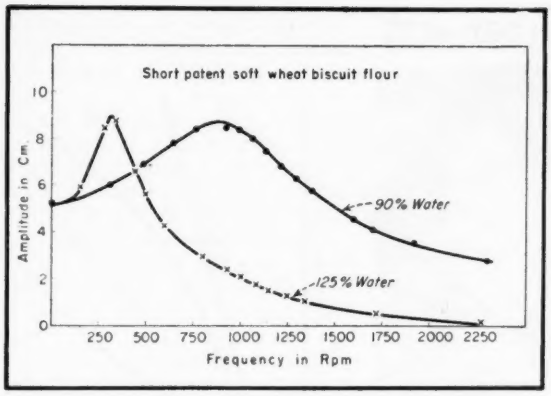
At the start we defined rheology as the systematic study of the deformation and flow of matter. The term initially came into being about 25 years ago as a natural grouping for many interrelated factors, such as viscosity, elasticity, plasticity, and hydrodynamics. It was found that certain basic rheological measurements were fundamental and common to all these material-flow phenomena.

By the same token, a remarkable variety of food product "qualities" fit into rheological classification because they are, in reality, true flow-phenomena. Thus considered are the "consistency" of catsup, cream-style corn, and soups; the "sag" of pectin jellies; the "stiffness" of dough; the "tenderness" of corn and peas.

Types of Flow

Basically, rheology classifies stress movement of matter into either elastic, reversible flow, or viscous, irreversible flow. In elastic flow the deforming force is held—as in an extended spring—as potential energy later to return the material to its original state. Viscous flow, however, dissipates its deforming force as heat.

In 1687, Isaac Newton observed that viscous liquids flow at a rate proportional to the pressure or force causing the flow. Since the viscosity of a fluid is a measure of its resistance to flow, it follows that its value—in poise—can be calculated as the constant



. . . AND ITS PROBINGS

Typical study (above) of varying elasticity in thick and thin batters indicates instrument's probing performance. Curves represent several amplitudes of both movement at selected frequencies—location of peak being measure of elasticity. Note how resonant peak of thinner batter shifted to indicate its lesser elasticity. This analytical function suggests interesting potential for unit in such jobs as routine mixing control (right).

FOOD FRONTIERS

ratio of applied pressure to flow rate.

Thus, the determination of an absolute value for viscosity is a fairly simple thing when dealing with fluids conforming to Newton's concept. Unfortunately, however, we find that many fluids—including most foods—do not obey Newton's law.

As it is, most solutions of fairly low molecular weight, such as water, brine, or sugar syrups, are "Newtonian" and have an easily expressed coefficient of viscosity. But more complex fluids, such as butter, catsup, and dough, are "non-Newtonian." And it is their evaluation that presents a challenge to rheology.

Rheologists find that non-Newtonians materials exhibit two different types of flow behavior. One group—called *pseudoplastic* materials—actually increase in flow rate out of proportion to the force applied. This is characteristic of most biological fluids or gels and indicates interaction of molecules.

The other non-Newtonian classification is called *dilatant* flow. Here, materials decrease in flow velocity with the force applied. Worked butter, for example, sometimes exhibits this increase in viscosity with rising stress. However, the phenomenon is not widespread in foods, and generally it is an indication of suspended particles with high surface charges in the fluid.

An interesting and highly important phenomenon in foods is known as "plastic" flow—or the tendency of the material to resist flowing until a certain minimum force, called its *yield value*, is applied.

The amount of force needed to spread cheese or butter on bread, for example, would be the product's yield value at a given temperature. Further, yield value must be built into the icing on a cake so that it will stand up. The pounding that is given catsup in a bottle must be in excess of its yield value.

Another unique flow phenomenon exhibited by some fluids is their tendency to thicken or thin under fixed force during a given time. This reversible work-softening is called *thixotropy* and sometimes "false body".

Pinpointing true thixotropy in foods has been a tough job for rheologists. Much work has been done to demonstrate this property in honey from certain species of heather. This sets into a rigid gel in time, but will readily flow again when stirred. Function of thixotropy in the work-hardening of butter and margarine has also been subject for much study.

Also, there have been observed still other flow effects that apparently are not related to the above classifications. An important one of these is *Spinn barkeit*, which describes the ability of fresh egg white, for example, to pull into long strings without shearing.

Elastic Effort

Up to here we primarily have been concerned with various aspects of viscosity, or non-recoverable flow. However, many foods exhibit elements of elastic as well as viscous flow—a further complexity.

Flour doughs contain both elements of elasticity and viscosity, hence usually display very complex rheology in process. Practical bakers long have tried to describe these effects by such terms as "short", "sticky", "bucky", or "slack".

Many specialized instruments have been designed to link dough characteristics to performance. Widely used for commercial evaluation of flour for its behavior in mixing are the Brabender Farinograph and Swanson-Working Mixograph. The former unit actually measures the viscosity of a flour-in-water suspension during a graduated time-temperature period, and its curve provides a good index of flour performance characteristics.

Also employed by cereal chemists are various units for measuring the resistance of dough to extension. The Chopin Extensimeter, for example, subjects a thin dough sheet to a con-

Turn Page for Basics of Rheological Behavior →

HOW RHEOLOGY ACTS

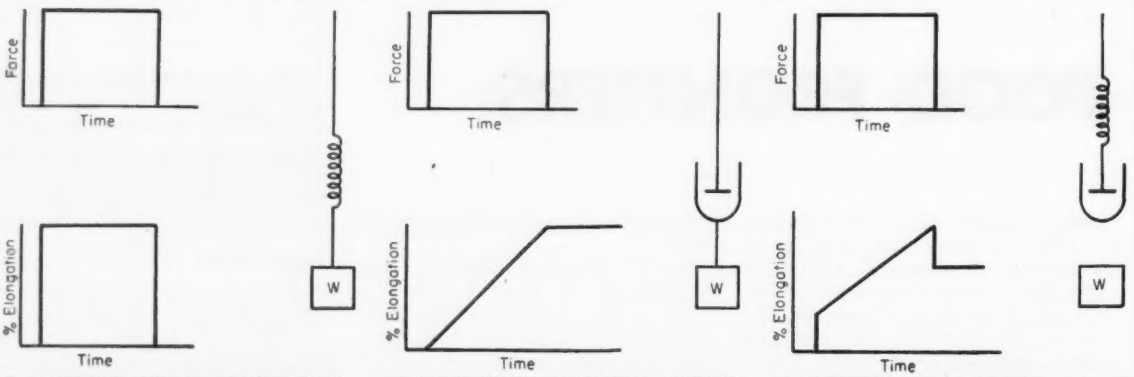
I NEWTONIAN VS. NON-NEWTONIAN FLOW curves (below) show why it is difficult to tab true viscosity of most foodstuffs

A LOW-MOLECULAR-WEIGHT FLUIDS SUCH AS A LOW SUGAR OR BRINE EXHIBIT TYPICAL NEWTONIAN STRAIGHT-LINE PLOTS STARTING AT INTERCEPT OF ZERO FLOW AND ZERO FORCE WHEN RATE-OF-FLOW IS PLOTTED AGAINST FORCE CAUSING FLOW. SLOPE OF THIS LINE IS COEFFICIENT OF VISCOSITY.

B MOST FOODSTUFFS, HOWEVER, ARE NON-NEWTONIAN AND EITHER INCREASE IN FLOW RATE, WITH FORCE SUCH AS A TYPICAL GEL, OR DECREASE IN FORCE, AS IN A WORK-HARDENED BUTTER. FORMER IS KNOWN AS PSEUDOPLASTIC, LATTER AS DILATANT FLOW. TRUE VISCOSITY MEASUREMENT BECOMES COMPLEX OFTEN INFLUENCED BY VARIABLES.

C SOME FOODS EXHIBIT FLOW-RATE CURVES DISPLACED ALONG FORCE AXIS, KNOWN AS "PLASTIC" FLOW—WILL NOT FLOW UNTIL MINIMUM FORCE HAS BEEN APPLIED. THIS FORCE, CALLED "YIELD VALUE," CAN BE FOUND IN NEWTONIAN FOOD (SUGAR ICING), OR NON-NEWTONIAN PRODUCTS (CATSUP OR CHEESE).

II ELASTO-VISCOUS BEHAVIOR, or combined effect of elastic and viscous flow, often makes food consistency a result of a system of rheology. Here, sketches show how much a system is built up.

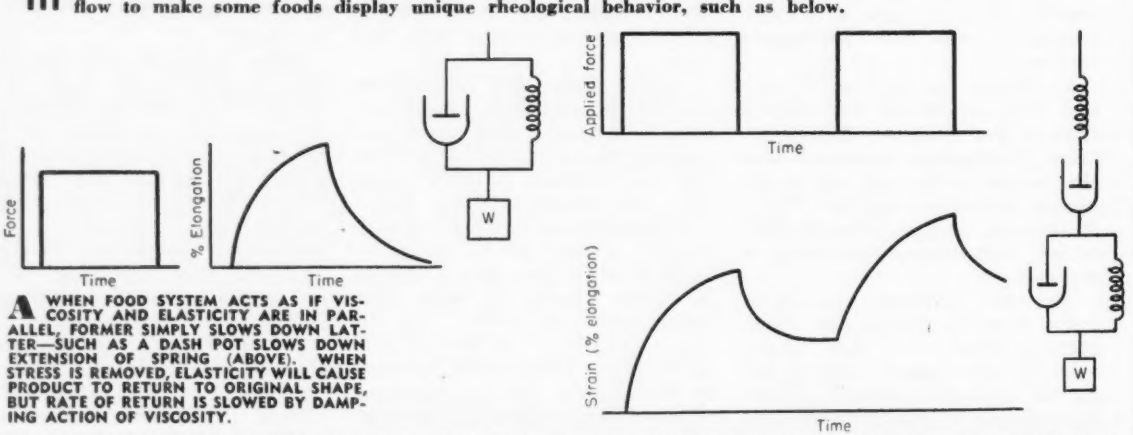


A PICTURING FOOD ELASTICITY AS EXTENSION OF A SPRING—PROPORTIONAL TO FORCE AS PER HOOKE'S LAW—PERFECTLY ELASTIC PRODUCT WILL EXTEND IMMEDIATELY AND REMAIN EXTENDED AS LONG AS FORCE IS MAINTAINED. WHEN FORCE IS REMOVED, PRODUCT WILL RETURN TO ORIGINAL SHAPE.

B VISCOSITY CAN BE PICTURED IN TERMS OF DAMPING OR DRAG OF A PADDLE IN A VISCOUS LIQUID (I.E., A DASH POT). THUS, IF PURELY VISCOUS FOOD IS SUBJECTED TO SIMILAR FORCE AS IN (A), PLOT OF PERCENT EXTENSION VERSUS TIME UNDER STRESS IS QUITE DIFFERENT.

C VISCOSITY AND ELASTICITY CAN BE PICTURED IN COMBINATION AS DASH POT AND SPRING IN SERIES OR PARALLEL. IN SERIES (ABOVE), SPRING EXTENDS IMMEDIATELY, REMAINING EXTENSION IS DAMPED BY DASH POT. AFTER STRESS IS REMOVED SYSTEM RECOVERS DUE TO ELASTICITY, NOT VISCOSITY.

III COMPLEX SYSTEMS usually combine various interactions of elastic and viscous flow to make some foods display unique rheological behavior, such as below.



A WHEN FOOD SYSTEM ACTS AS IF VISCOSITY AND ELASTICITY ARE IN PARALLEL, FORMER SIMPLY SLOWS DOWN LATTER—SUCH AS A DASH POT SLOWS DOWN EXTENSION OF SPRING (ABOVE). WHEN STRESS IS REMOVED, ELASTICITY WILL CAUSE PRODUCT TO RETURN TO ORIGINAL SHAPE, BUT RATE OF RETURN IS SLOWED BY DAMPING ACTION OF VISCOSITY.

B (RIGHT) COMBINATION OF BOTH SERIES AND PARALLEL ARRANGEMENTS OF ELASTICITY AND VISCOSITY (SPRINGS AND DASH POTS) WOULD BEHAVE AS ABOVE. NOTE RETRACTION TO ORIGINAL LENGTH IS AMOUNT OF ELASTICITY—OR STRENGTH OF SPRING ELEMENT—IN SYSTEM. THIS COULD BE SITUATION IN FLOUR DOUGHS.

trolled-pressure air bubble, and the rupture-pressure points to ultimate bread volume and structure of its crumb.

While the above process-simulating instruments have been very valuable to the practical baker, their readings primarily are empirical, in that they involve the sum-total interaction of several rheological factors. Hence, they are not necessarily ideal in furthering basic studies of the various dimensions involved in dough behavior.

In 1932, the British rheologist, Scott Blair, developed what he called an "isterometer" during his endeavor to isolate the elastic effect. His object was appraisal of the recovery characteristics of dough after stretching.

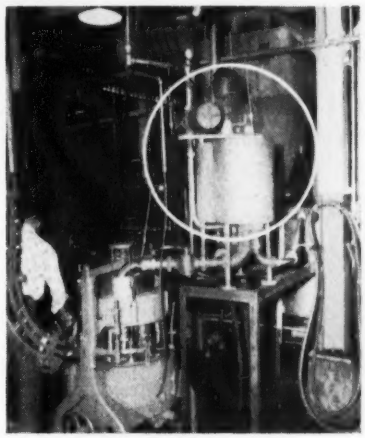
In effect, the isterometer is similar to instruments used to test the tensile strength of plastics or metal billets. However, since dough would not support its own weight if hung vertically, the unit gages the frictionless horizontal stretch of strips laid out on a pool of mercury. Thus, resistance to stretching is an actual measure of the combined effect of elasticity and viscosity in the dough.

Use of the isoterometer has proved very revealing in comparing the effect of various ingredients on the elastic and viscous properties of doughs. Workers at Monsanto, for example, found that pyrophosphate type leavening agents may, under certain circumtances, produce more extensibility than is the case with calcium phosphate leavening systems.

Stimulated by these studies, the

Rheology-Type Controls

FLOUR PERFORMANCE in mixing and subsequent processing is predicted using Brabender Farinograph, which measures electrical torque developed in a controlled slurry-beating.



CORN CONSISTENCY is gaged by passing cream-style product-stream through tank and measuring torque developed by mixing rotor. Automatic controller then blends to desired value.

What's Ahead

A step—at least, a *cautious* step—is invited into the realms of conjecture. Thus, we may be able to see where this now-unfolding rheological concept of "food-flow" is likely to lead.

First, there are apparent two basic benefits, immediate and long-range in their effect—

1. Rheology provides the means for "getting the feel" of what you are measuring, and it may put many now-empirical tests on a more objective basis.

2. As a long range, basic research tool, rheology provides a "probe" for quantitatively relating physical properties to the structure of materials.

Consider the immediate view: Rheological studies are proving that many of the accepted tests for food quality are not dimensionally simple, but often reflect the interaction of several factors, such as viscosity, elasticity, thixotropy, etc. Yet only one of these factors may be of prime importance in quality from the acceptance standpoint.

Hence, applied rheology—in the development of a proper measuring technique—may simplify these tests, build a quantitative scale for the quality, and perhaps set the stage for true control.

Consumer acceptance of such products as cream-style corn or oatmeal cereal provide an example. It has been observed that when these products display a certain off-consistency there may be a tendency for the eater to gag—usually meaning a lost customer.

Perhaps by studying the shear forces during eating of such products and locating these on rheological curves a more realistic conception of the causes for "gagging" may be determined. And steps can then be taken to circumnavigate this factor directly in the product.

The fact is that many of the texture and viscosity measurements now employed on foods usually involve much more than meets the eye—hence, the frequent difficulty processors experience in trying to establish many of these as bases for control.

"BUILDING-IN"

Even more significant, however, are the possibilities afforded by rheology as a route to positive improvement of foods.

As described above, the first step in rheological investigation is to evaluate the product to see how it ties in with known systems. When critical factors thus are isolated, an attempt can then be made to alter the product rheologically and make it conform to a desired flow.

Study of prepared-mix rheology, for example, may suggest "building-in" a modicum of elasticity to permit a nice automatic release from the pan along with maximum volume after baking. Similarly, manipulation of the yield value in catsup might lead to an ideal non-soupy product that ejects from its bottle with a gentle tap.

A prime possibility—one that Monsanto researchers are plumbing—would be the selection of ingredients with rheological properties that would produce a desired texture in the finished food.

Still another intriguing aspect of building-in via rheology would be the potential for improving the efficiency of processes. Today, most food equipment is limited by the properties of the material it must handle. The high-vacuum evaporator, for instance, becomes inoperative when product viscosity or thickening goes beyond a certain point.

Why not rheologically tailor the product to permit its evaporation well beyond that limit through temporary attentuation of its viscosity?

The same advantages could accrue in surface-type heat exchange. Reducing the viscosity of the material would produce a thinner film and better heat-transfer.

Conjecture is easy, and the projection of what rheology might do for the food processor could fill many pages. However, we must not oversimplify. There is a great deal of lore to be developed in this basic science before its fruition—and already much of its know-how involves fairly complex mathematics that require the approach of a specialist.

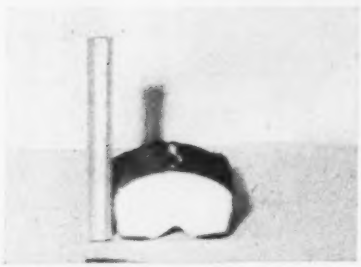
So rheology cannot simply be put to work like a new microscope or slide rule.

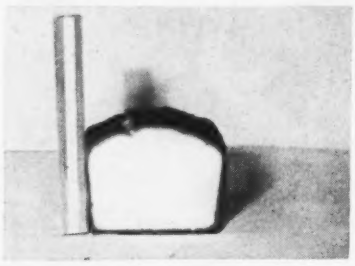
But one thing is certain: Work to date is promising enough to suggest that the rheologic approach eventually will become just as common in the food plant as are those familiar tools today.—*L.E.S.*

Monsanto researchers decided to go a step further and try to develop a "single-dimension" instrument that would be independent of viscosity and respond only to elasticity.

Adopted by John Van Wazer and Robert P. Joslin, the instrument evolved has been called a "resonance elastometer" in that it measures elasticity as a function of resonant frequency—an operating principle quite new to the food field.

Rheology Potentials

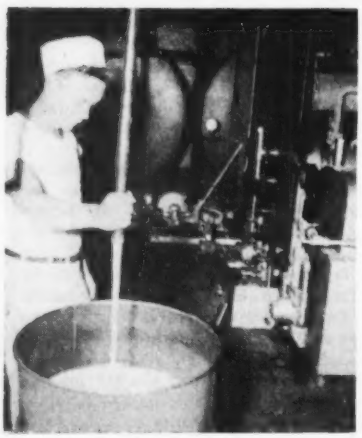




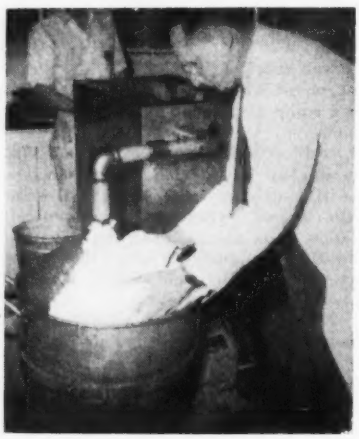
BAKING may realize new maximums in yield, unvarying precision in results, through applied rheology to flours, ingredients, doughs, mixes.

CHURNING and work-hardening of products such as butter and margarine may achieve greater precision and yield through rheological probings.

CONCENTRATION to near-solids may be possible by building-in rheological properties in materials. Above is unusual view inside hi-vac chamber.



SHORTENING and lard textures are based on rheology, also subsequent performance of these products in baking. Seen is lard conditioned by Votator (rear) at Omar, Inc., Omaha.



CANDY-MAKING invites building-in of rheological properties in ingredients to attain highly-predictable whips. Here, J. Alikonis displays confection made in continuous whipper.

Essentially, the resonance elastometer consists of a free-swinging bob suspended in a sample-bearing cup. The cup is set up to oscillate at varying speeds, and its only connection to the bob is through the product. Since the bob is thread-suspended and employs a light beam for frictionless indication, its movement in response to cup oscillation is a function of the properties of the product being tested.

Movement of the bob varies, of course, with the viscosity of the fluid tested. Water conveys very little movement to the suspended bob. But a more viscous liquid causes it to attempt to follow movement of the cup at very low speeds. However, when oscillation speed is increased, this bob movement actually decreases until the bob comes to an essentially fixed position.

Elasticity measurement with this instrument comes into the picture through the elastic properties of material placed in its cup. Acting like a series of encircling rubber bands from cup to bob, the material exerts a "pull" in both directions as the cup oscillates. At one particular speed of oscillation—the "resonant frequency"—this pull in one direction will occur just as the extending force is in balance with the elastic restoring force. Causing maximum swing of the bob, this provides a reading for a product's elasticity independent of its viscosity.

To secure a frictionless reading of this maximum rotation of the bob, a mirror and light-beam system is used that projects onto the wall a reflection of the hair line in the lamp assembly. Amount of movement is thus measured in frequency or rpm. required to secure maximum linear swing or amplitude of the hair line.

In order to adapt the instrument to rather wide variations in product elasticity, there was developed a series of replaceable bobs with increasing moments of inertia. This was achieved through materials of varied weight—a plastic bob, for example, being used for cake batters and a steel one for biscuit doughs.

Working Results

Early work with the resonance elastometer primarily has been on flour doughs. The unit has demonstrated varying elastic characteristics of thick and thin batters, and suggested its possible function as a valuable tool in dough classification and, perhaps, as a control instrument.

However, Dr. Joslin points out that at this time his laboratory, mainly is concerned with use of the unit as a research tool. He believes its contribution to a better understanding of the

(*Turn to page* 140)

INSPECTION of incoming glassware is carried on in lab. This control at Refined Syrups & Sugars, Inc., Yonkers, N. Y., assures production department of non-faulty containers and thus smooth line performance.

You Get Faster Throughput by—

CHECKING YOUR SUPPLIES

To keep uniform-quality packaging materials rolling into your plant, apply a precise sampling-and-inspection routine. Here's how—with working details on glass-container pre-checks and "specs"

FE STAFF

Prime reason for setting up a system of sampling and inspecting incoming packaging supplies is to assure the production department of uniform quality materials at all times.

For if they don't come up to "specs", then the final package will be of faulty construction, especially if it comprises a number of materials—like a closure and glass container or a carton liner, carton, overwrap, or even display carton. Faulty packages result in product losses, whether they're attributed to poor containers or high-percent fill of costly items.

Too, rigid adherence to specs is a "must" for today's high-speed packaging lines equipped with fully automatic machines. For feeding of faulty materials to such a line may play hob with the equipment, causing costly delays and downtime.

On the other hand, adoption of a precise statistical system should save processors time lost in returning satisfactory lots that might otherwise be rejected upon haphazard inspection. And it should protect suppliers from taking back these lots.

In time, inspection records may point out the need for reducing or tightening sampling procedures. They will also enable a user to compare the quality of materials from various suppliers.

Also, in time, this checking system will bring about improvements in the quality of supplies. In so doing, these improved materials will reduce production-line stoppage when being handled on tomorrow's higher speed machines. They'll also improve morale of line operators and maintenance crew.

Keeping production supplied with uniform quality materials involves checking each lot to make certain that: (1) Supplies adhere to dimensional specifications, and (2) defects do not go above an established, acceptance number.

To conform to dimensional specs, a specific number of samples from a shipment should be tested, with proper devices, and then these measurements should be compared with written specifications.

Primary task of an inspector is to check, in an objective manner, the number of defective pieces in a sample lot while constantly referring to written specifications issued by a quality or production control department.

Changes in specs must always be brought to the attention of the inspector so that he can keep his records straight and carry out his work without confusion.

An inspector should always look for and record those defects not included

(*Turn to page 134*)

Newest Units at Packaging Show

Striking advances in equipment, devices, and materials—53 of which are highlighted here—spark move to much-better, far-faster line performance

ACCELERATED technical strides were reflected in the equipment and materials displayed by 350 exhibitors at American Management Assn.'s 23rd National Packaging Exposition attended last month in Atlantic City by 24,200.

Evident were the results of competition-stimulated research—a wealth of new packaging applications as well as improved equipment and materials.

Especially significant were the advanced machines—now more highly mechanized to run at greater speeds, and with less need of maintenance and less call upon skilled operating personnel.

Special devices to curb production delays were predominent. Also better-built machines to improve performance. And automatic lubricators to reduce maintenance. Smaller, lighter electric brakes and clutches promise to open new fields in continuous-flow packaging. They will bring faster operation to machines and automatic control of low-torque packaging drives.

Spotted, too, was the trend toward newly attractive, low-cost, spoilage-preventing packaging materials.

The goal of equipment automation was mirrored by displays of photoelectric relays as well as electronic timers.

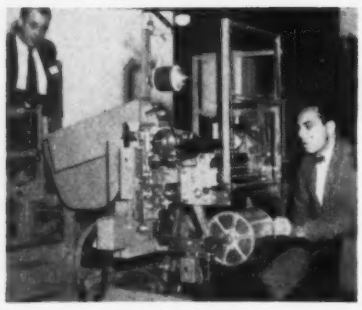
Trail-blazing were the compact, multi-function machines designed to run at top velocity, while eliminating manual transfers, also reducing mechanical transfers. Built for small and large-volume packers, these machines form, fill, seal, and print packages.

Particularly noted was the fact that equipment makers aren't talking recession. Some actually are operating at higher levels than in any recent year. In fact, order backlogs in some instances are at a new high.

According to Robert T. Forman, president of the Packaging Machinery Manufacturers Institute, new orders and backlogs are up 14%, and shipments will be 11% higher this year than the average through 1950-1953.

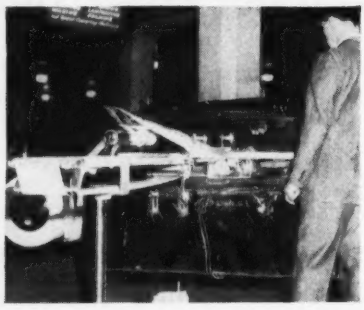
9 WRAPPING MACHINES:

Stress on higher speeds, versatility (film and product), and improved sanitation . . . Two tear-tape attachments

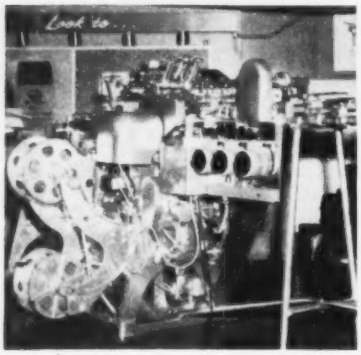


NEW cross-tape device on wrapping unit cuts tape to length, carries it across sheet, and applies it (with wax or resin) to inside wrapper.—Package Machinery Co., Springfield, Mass. (80A)

TEAR TAPE attachment on wrapping machine was designed for packers of a variety of small-size items. Rate: 45 six-pack candy bars per min.—Scandia, N. Arlington, N. J. (80B)



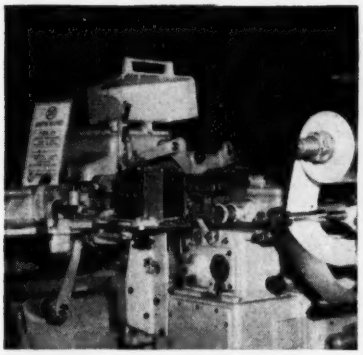
150-PER-MIN. wrapper designed to meet sanitary codes in dairy field. Wraps ice cream bars, custard, sandwiches.—Hudson Sharpe Machine Co., Green Bay, Wis. (80C)



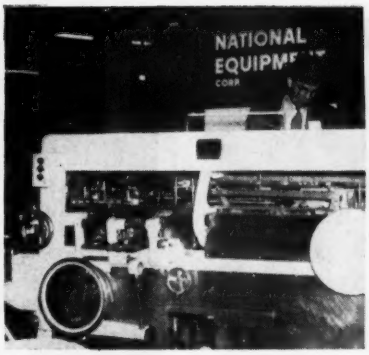
ADVANCED machine precision-wraps multiple-unit packages of cracker sandwiches. Rate: 100 packs per min. Efficiency features accented.—Lynch Corp., Anderson, Ind. (80D)

UP-TO-80-A-MIN. wrapper for sliced meats handles all heat-sealable film, including saran and Pliofilm. Has label and card-feed attachments.—Wrap-King Corp., Holyoke, Mass. (80E)

FORM-A-BAG machine wraps and seals items like smoked fish in 4-in.-wide, 140-gage Pliofilm at 25 per min. Maker: Cloud Machine Co., c/o Curtiss Candy Co., Chicago. (80F)



THIS versatile wrapping unit has output of 160 candy bars (1/3-3 oz.) and similar items per minute. Bars fed right-side up. Displayer: Stokes & Smith Co., Philadelphia, Pa. (81A)



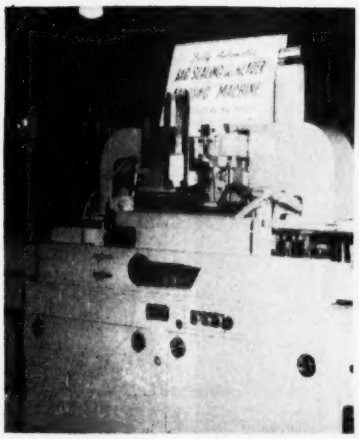
PORTABLE overwrap unit needs no change parts for different size packages. Handwheels do job. Has "exact fractional" paper measurer.—National Equipment Corp., N.Y.C. (81B)

NEW disk wrapper handles various shaped items with variety of films and foils. Compact, high-speed unit (150 per min.) has sanitary features. —National Equipment Corp. (81C)

6 SEALING UNITS:

Latest innovations in electronic, reverse-impulse, gas- or vacuum, and multi-function sealing techniques

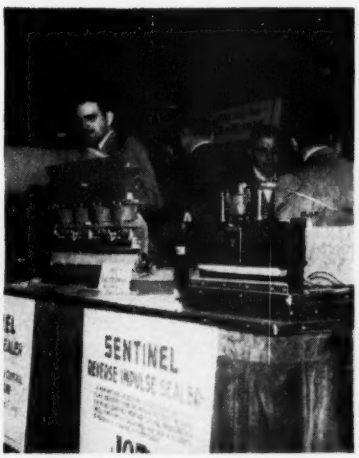
YOU FLIP A LEVER to either gas- or vacuum-pack bagged items in this new dual-head sealing machine. Displayed by Standard Packaging Corp., Jersey City, N. J. (81D)



ADJUSTABLE sealer-header receives open bag, "times" it in, tucks gussets, applies header, and seals bag. Speeds up to 65/min. Maker: Peters Machinery Co., Chicago. (81E)

BAG SEALER incorporates ink-printing, hole-punching, and "Tear Here" bag-opening devices. Also has built-in vari-speed drive. Manufacturer: Pack-Rite Machines, Milwaukee. (81F)

ELECTRONIC unit weld-seals saran to form hermetic packages. Thermatron machine does not affect film's properties—Cargo Packers Special Products Co., B'klyn. (81G)

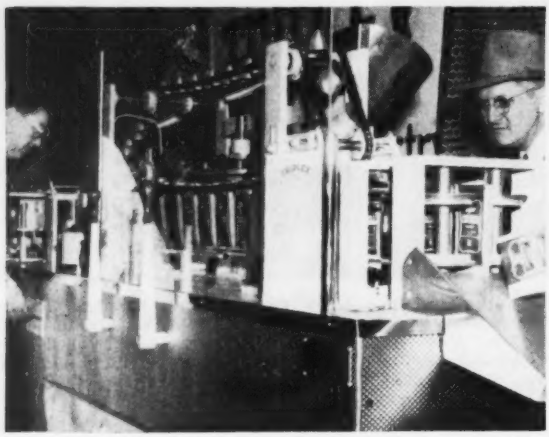


REVERSE-IMPULSE sealers handle any heat-sealable film.—Packaging Industries, Montclair, N. J. (81H)

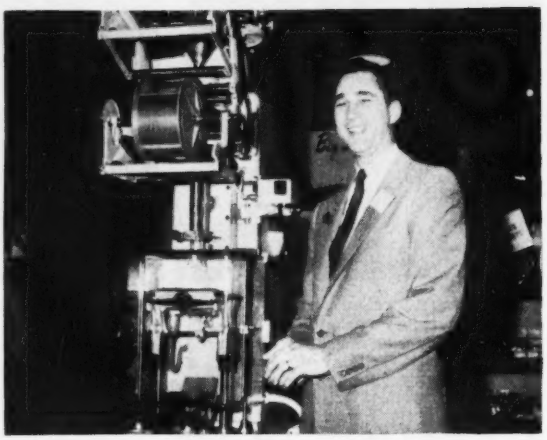
ROTARY sealer handles stem-removed produce in "poly"-bags up to 60/min. R. Chaffee & Co., San Francisco. (81I)

Packaging Show Continues →

2 BAG FORMERS-FILLERS: Newest in 1-machine "packaging lines" to form, fill, and seal bags . . . Low and high volume units

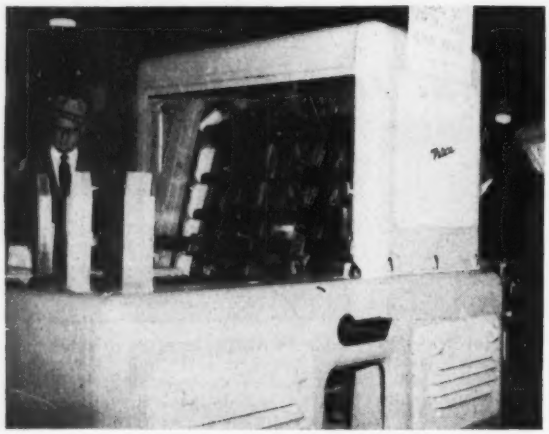


STRAIGHT-THROUGH unit takes heat-sealable film from roll, then makes, fills, seals 130 bags a min. Electric eye controls line speed.—Triplex Industries, Inc., Chicago. (82A)

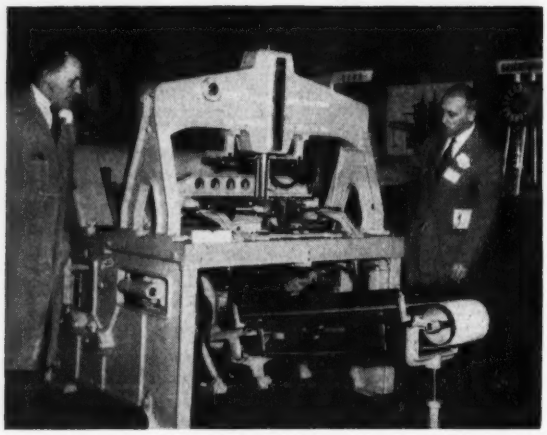


SINGLE FEED machine is designed for low-volume output. Feeds operate on low-cost unit for most films.—Transparent Wrap Mach. Corp., Hasbrook Hgts., N. J. (82B)

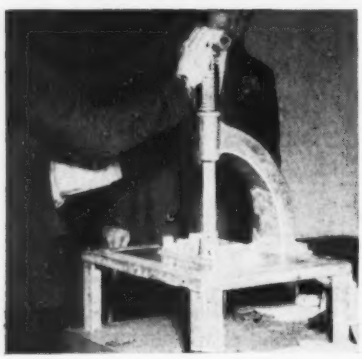
4 CARTON FORMERS; CARTONER: Advances in automatic (high speed) and semi-automatic (low volume) machines



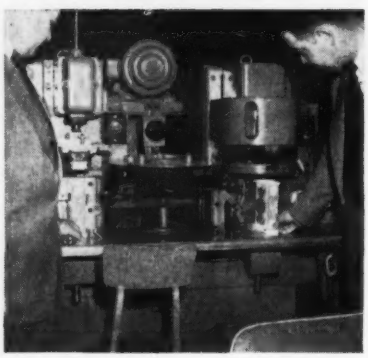
FORMING machine sets up and glues trays or cartons at rate of 165 per min. Takes blanks 9½-22 in. wide and 6-18 in. long. Displayer: Peters Machinery Co., Chicago. (82C)



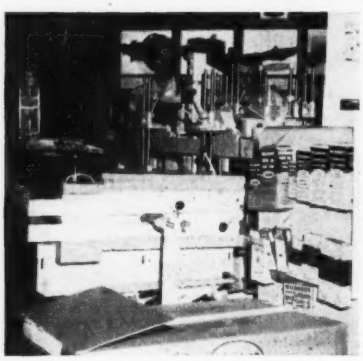
MACHINE feeds, glues, forms 120 boxes a min. from scored, flat blanks. Features rotary feed and glue applicators, also "no blank, no glue" device.—U. S. Automatic Box Machinery Co., Boston. (82D)



COMPACT, 30-per-minute, semi-automatic carton former is ideal for medium runs of boxes or lock-types trays. Size changes in 60 sec.—S. Curtis & Son, Sandy Hook, Conn. (82E)

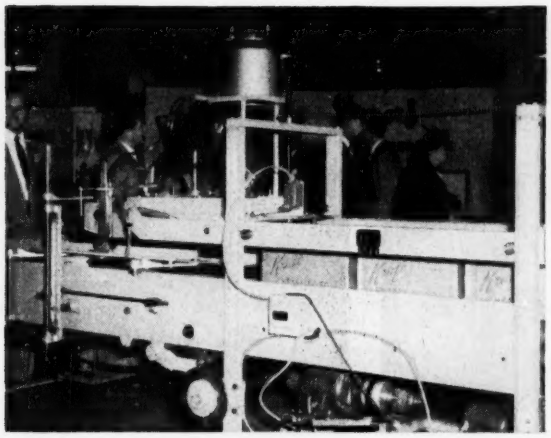


SEMI-AUTOMATIC unit seals bottom and top of Eco-Pac (paperboard) box. Low-cost box is siftproof, rigid, tamperproof, air-tight.—Alfred Hofman & Co., W. New York, N. J. (82F)

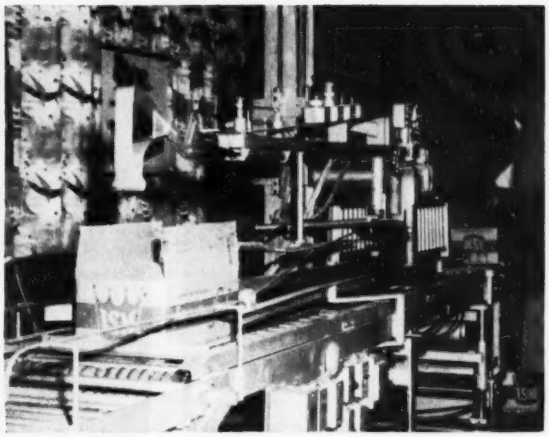


CONSTANT motion, vertical cartoner takes flat carton, opens, tucks bottom flaps, conveys to manual loading station, and tucks bottom flaps. Maker: R. A. Jones & Co., Cincinnati. (82G)

2 CASERS: Emphasis on machine adjustability and safety devices . . . One staples and other strip glue-seals loaded shippers

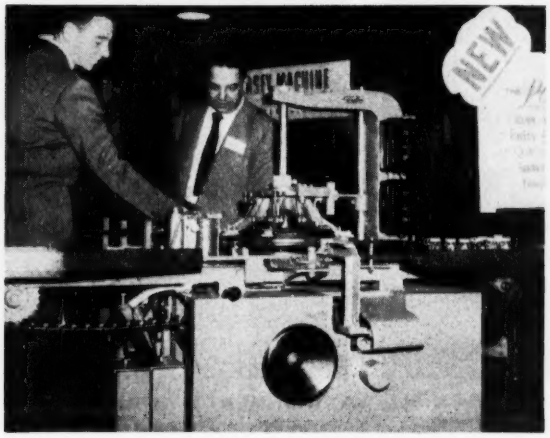


SHORT case sealer (11 ft.) features rapid case-size adjustment, strip-glue applicator, jam-preventing devices.—National Equipment Corp., N.Y.C. (83A)

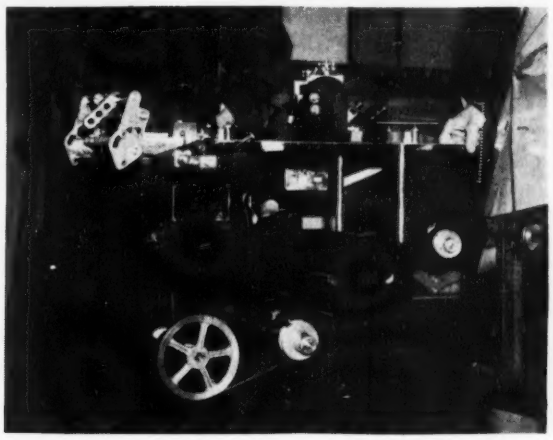


DUAL-HEAD stapler drives 2, 4, or 6 staples into top and bottom of cartons at rate of 1,000 per hr. Maker: International Staple & Machine Co., Herrin, Ill. (83B)

5 LABELING DEVICES: Progress in glue and thermoplastic labeling . . . Also simplified, semi-automatic units



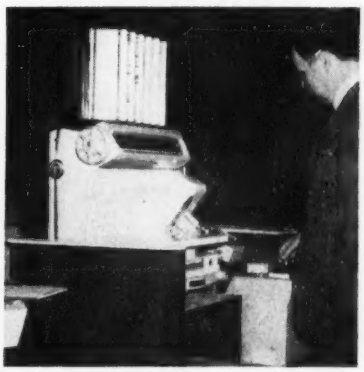
FULLY AUTOMATIC Pony Express labeler handles varishape containers at rate of 70 per min. Self-cleaning featured. Displayer: New Jersey Machine Corp., Hoboken, N. J. (83C)



SEMI-AUTOMATIC unit applies labels to round containers. Rate: 40 per min. Glue is electrically heated and thermostatically controlled.—Kenneth J. Moore & Co., Chicago. (83D)

300-PER-MIN. labeler takes roll-fed stock, code-prints, and cuts labels to size (1 to 7 in.). Displayed by manufacturer: Dumatic Industries, Philadelphia. (83E)

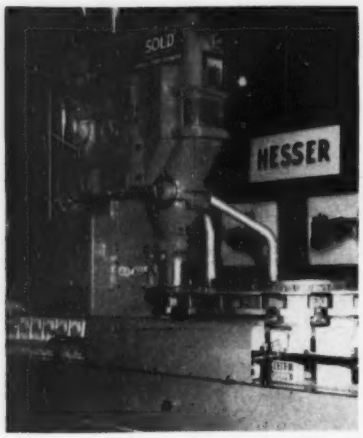
HAND-OPERATED dispenser of delayed-tack pre-coated labels.—Dispens-A-Label Devices, Pittsburgh. (83F)



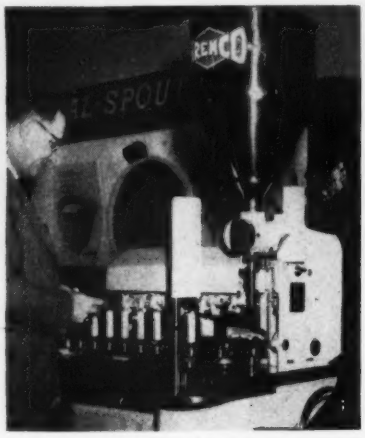
SCALE automatically prints weight, price, and value of prepackaged items.—Toledo Scale Co., Toledo. (83G)

Packaging Show Continues →

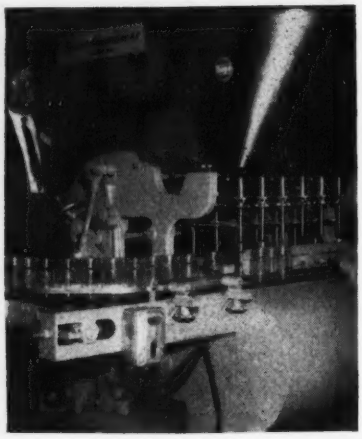
6 FILLERS: Trend toward machines with fewer, simply designed, and easily accessible parts . . . Production-delay-curbing devices



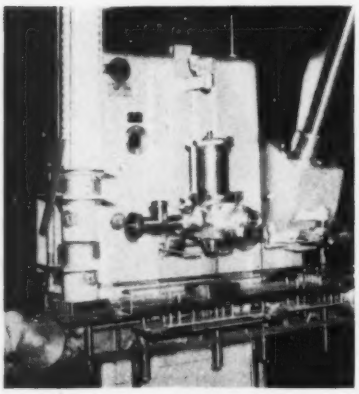
NEW cocoa filler, with 24-pocket, rotary feed, has 58-per-min. container output. Features vacuum and dustless filling and hydraulically-operated vibrator.—Geveke Co., N.Y.C. (84A)



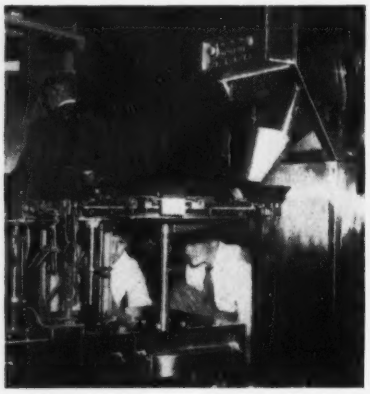
TUBE FILLER handles jelly at 55 units/min. (8 oz.). Has automatic tube-cleaning, cap-tightening, and "no-tube, no-fill devices."—Arenco Mach. Co., N.Y.C. (84B)



6-VALVE FILLER is compact, easy-to-maintain. Has "no-container, no-fill" device. Speed now boosted to 150 containers/min. Maker: Hope Machine Co., Philadelphia. (84C)



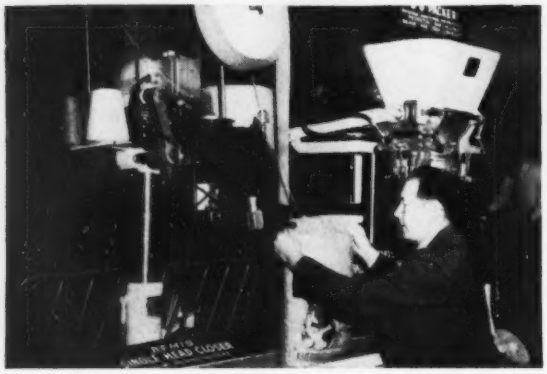
HOPPERLESS ice cream filler takes product from freezer to Sealright capper, then to freezing tunnel. Rate: Up to 60 per min.—Anderson Bros. Mfg. Co., Rockford, Ill. (84D)



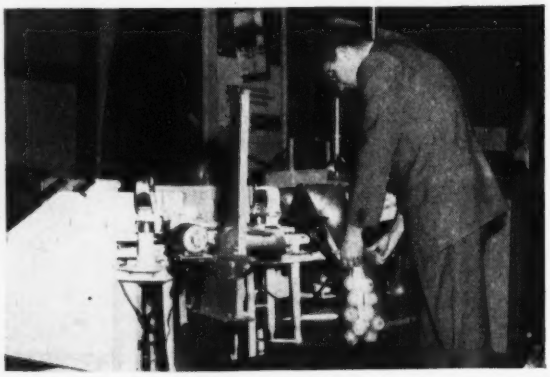
LATEST weigher handles free-flowing items at speed of 42 per min. Employs two hoppers on scale with patented transfer mechanism.—Woodman Co., Inc., Decatur, Ga. (84E)

ATTACHMENT to Hy-Tra-Lec weigher automatically feeds bags onto turret and receives charge of potato chips from weigher.—Wright Machinery Co., Durham, N. C. (84F)

2 BAGGERS: Improvements in dustless, economical bagging of powdery items and latest in semi-automatic bagging of produce



COMBINED bag holder and sewing unit reduces dusting and bag-closing costs. Has variable-speed attachment, angle closing.—Bemis Bro. Bag Co., Minneapolis. (84G)

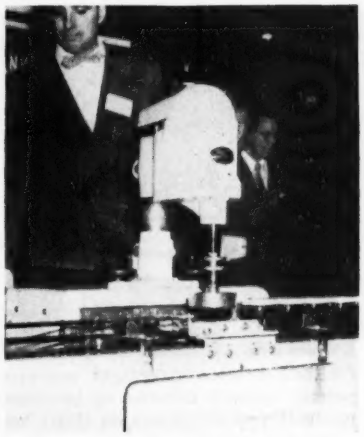


BAGGERS. One-header (center) weighs and fills 1-15 lb. of fruits and vegetables. Two-header handles up to 25 lb. Manufacturer: Trescott Co., Inc., Fairport, N. Y. (84H)

2 CODERS, CAPPER: Newest in coders for flat or sheet material and cylindrical containers . . . Metal and plastic screw-capper

ROLAPRINTER designed for continuous printing or code-dating of roll, sheet, or strip material. Compact unit goes on packaging machines.—Adolph Gottscho Inc., Hillside, N. J. (85A)

ANOTHER unit imprints identification copy, codes, etc. on cans, tubes, canisters, and other cylinders at packing station. Maker: A. Gottscho Inc., Hillside, N. J. (85B)



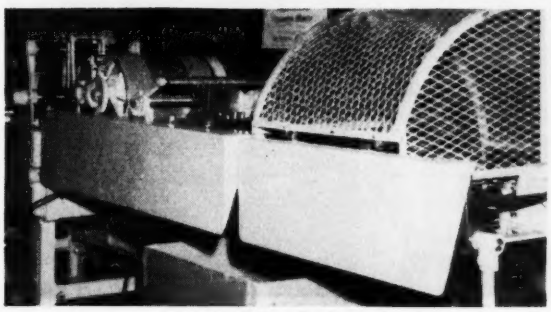
SINGLE-HEAD, variable speed (up to 60 containers per min.) capper features finger-tip adjustment wheel control for metal or plastic screw caps.—Kurhan Co., Inc., N.Y.C. (85C)

2 HEADSPACE CHECKERS: To check vacuum in line-conveyed sealed jars and to analyze headspace gas on the spot

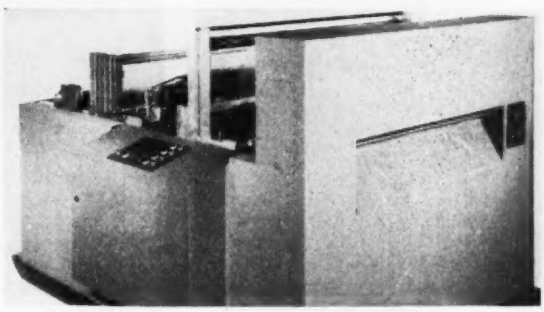
ROTARY detector checks vacuum in sealed products and rejects jars not sealed according to "specs" or those with improperly applied closures.—Crown Cork & Seal Co., Baltimore. (85D)

ON-THE-SPOT head-space analyzer comprises gas sampler to trap head gas from cans and analyzer that indicates oxygen (%) on scale.—Crown Cork & Seal Co., Baltimore. (85E)

2 BAG FORMERS: Take polyethylene and other films to make flat or gusset bags and also liners for drums



BAG MAKER forms 70 plain or gusset bags a min. from flat or tubular "poly" or Pliofilm stock. Has stacking, counting devices.—Simplex Packaging Machinery, Oakland, Calif. (85F)

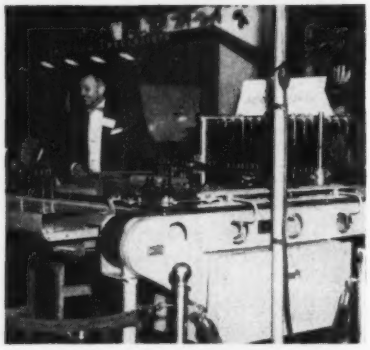


BAG MAKER forms drum liners from "poly" or other films.—Packaging Industries, Montclair, N. J. (85G)

Packaging Show Continues →

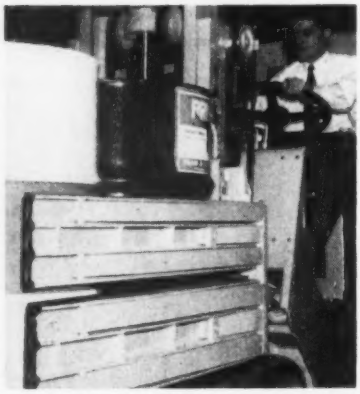
6 "MOVERS": Specially designed conveyors and in-plant trucks for transporting a variety of packaged goods

CRESCENT-SHAPED flight conveyor permits smooth transfer of packaged products around corners on single belt without need of rail guides.—Chain Belt Co. of Milwaukee. (86A)



500-CONTAINERS-PER-MIN. Walkie-Pushie unscrambler features new, low-cost narrow-belt conveyor.—Island Equipment Corp., Long Island City, N. Y. (86B)

SPECIAL TRUCK has 40-finger lift attachment for automatically indexing and lifting various types of loads. Manufacturer: Baker Raulang Co., Cleveland. (86C)



LIFT TRUCK with Rheem clamp arms handles 1, 2, 4, and 6 drums at a time as well as palletless cases. Displayer: Yale & Towne Mfg. Co., Philadelphia. (86D)

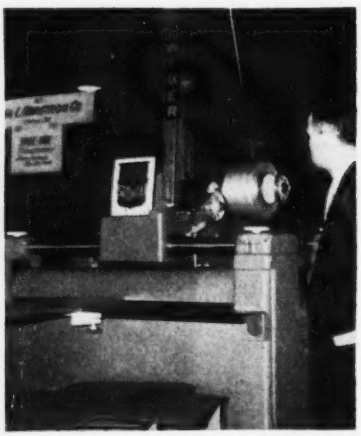
MAGNETIC conveyor elevates metal closures to hopper feeding capping machine. Eliminates guard rails. Maker: Rapid-Standards Co., Inc., Grand Rapids, Mich. (86E)

SAFETY SILHOUETTE truck protects operator from butting into any overhead; simplifies pallet loading in tight spaces.—Yale & Towne Mfg. Co., Philadelphia. (86F)

MISCELLANEOUS: Featured are web-scanning device, 2-in-1 can taper, and machine for applying strip tape to cartons

OPTICAL scanning device has mirror rotated at speed to give stationary, reflected image of moving object. Used on web-press printing.—National Laboratories, Ridgewood, N. J. (86G)

PORTABLE unit applies 1-in. strip of printed, pressure-sensitive tape to two cans (end to end) to form piggy-back cans. Maker: Dellenbarger Machine Co., New York. (86H)



PORTABLE machine applies tear strip for easy carton opening. Rate: 1,000 ft. of tape per min. Blanks from 11-48 in. wide by 26-in.—H. G. Weber & Co., Kiel, Wis. (86I)

Case Of The Disappearing Bread Boxes

At first, all the wooden containers would be there (▭ ▭ ▭ ▭). Then, mysteriously some wouldn't be there (▭ . . ? . . ? . . ? . .). A bit of Sherlocking finally traced the trouble. . . . But most important, a new metal-framed fiberboard box stopped it—and stopped other annoying dollar-sapping, too

RAY BLOOMBERG
FE Correspondent, Seattle

There's been good reason for bakers to complain.

As one of them put it, "You lay out a chunk of money for a supply of these wooden boxes—but almost before you know it, a number of them have vanished. Then you have to order more."

Employed for delivering bread and sweet goods, the containers go out loaded and, subsequently, all are supposed to come back to the bakery for routine and regular repeat trips. Only they don't.

Ultimately, with a bit of tracing here and a quiet check there, the answer was pieced together: "The boxes 'simply went'—like hotel towels, except here you couldn't add it on the bill."

This constant "open season" on the containers has been promoted by their easy availability, their adaptable size, and the materials of which they are fabricated. Among other things, the purloiners have utilized them for shelving, for storage of canned goods and fresh vegetables, for firewood, and even as receptacles for garbage.

Yet in situations of this sort one doesn't "call the law" on his good customers. Instead, it is far better to remove the cause by means of inventive ingenuity.

► **In short, the solution lay in eliminating the practicability of such shippers for anything except the task for which they are intended.**

The Del-Tra, manufactured by Benner-Nauman, Inc., Oakland, Calif., is an entirely new conception of a bread container. Now in use in bakeries located in 36 states, the Del-Tra has cut pilferage losses to a minimum.

Sanitation Up, Repairs Down

In addition, the new container provides better sanitation and maximum protection for bakery products. Moreover, it cuts the old losses resulting from damage to boxes and consequent need for repairs.

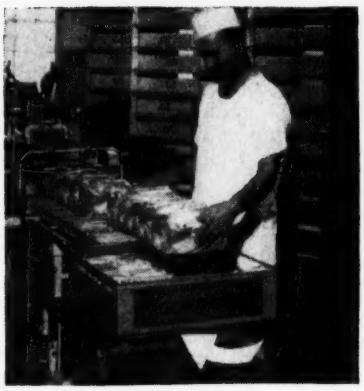
Replaceable Liners

These sturdy, lightweight trays are comprised of a metal frame having no fixed sides, bottoms, or tops. The removable sides, on which the baker's name is printed, are made of corrugated fiberboard. When soiled, this corrugated liner may be replaced. With baked goods wrapped in waxed paper, the liner is usually removed in from 4 to 6 months and with cellophane-wrapped products in about 1 year.

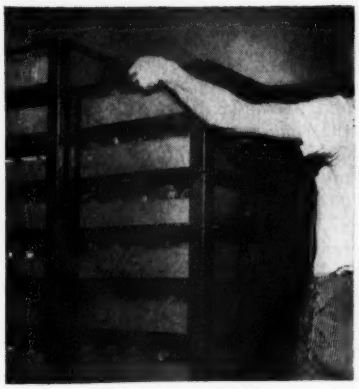
The light steel frame has a stacking rib along the sides at the bottom. This ribbing makes it possible to nest 16 single-layer trays. And when trans-

(*Turn to page* 155)

And Its Solution

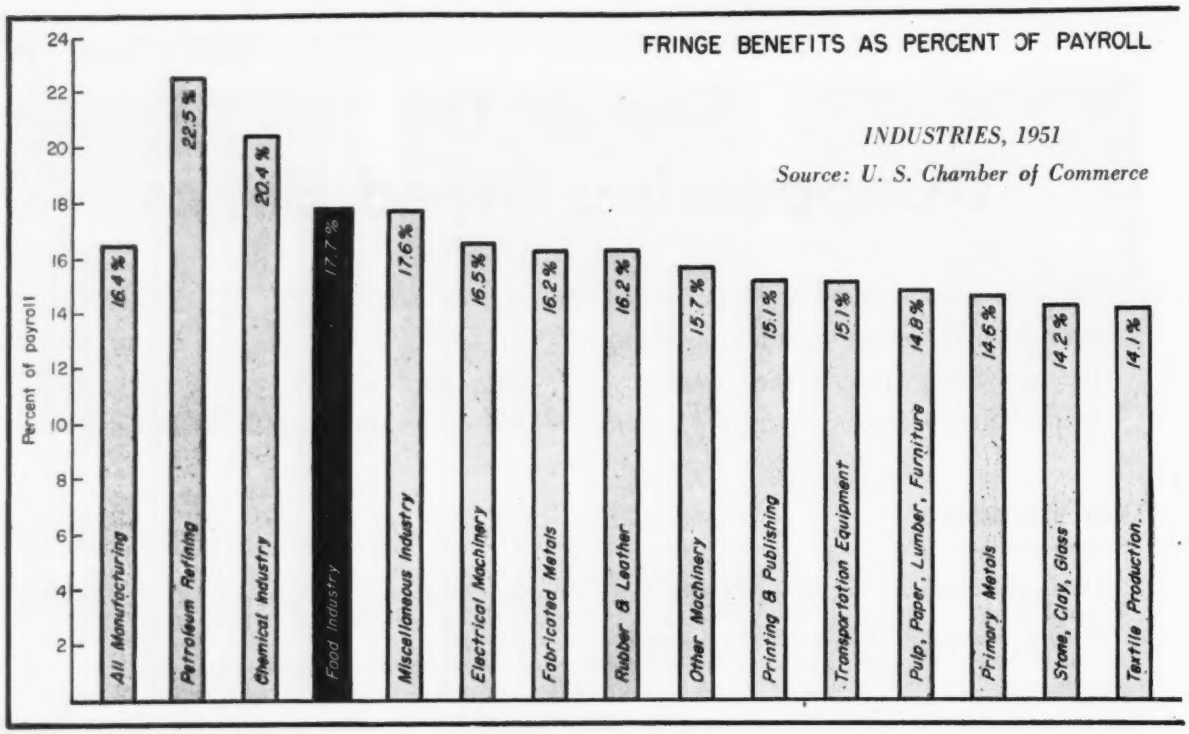


Pack swiftly
Fabricated to user's specs, new containers are loaded in jig time, as seen at Gorman's Bakery, Central Falls, R. I. Note nesting rib (arrow).



Nest steadily
Stable pallet-loads, each holding 22 boxes totaling 220 of 1½-lb. loaves, are made up at Buchan Baking Co., Seattle. Ribs "groove" boxes together.

Deliver handily
Load on a Gorman truck illustrates convenience of special open ends. Driver readily may "pull" either full tray or individual loaves.



FRINGE BENEFITS in the food industry reached 17.7% of payroll in 1951. And they're still spiralling up.

Don't be *Fooled by Fringes*

Cost of labor "extras" high—and going higher. It's wise to know yours, to tell your workers, and to account the costs in calculating equipment payoff

IVAN M. MILLER
Associate Editor, "Food Engineering"

"If we install that new equipment in Plant No. 3, we'll not only smooth out production but we'll also save the cost of 5 workers."

. . . This is Joe Smith talking at the finance committee meeting of Food Co. Being project engineer he's well aware of the importance of the proposed changes and is fighting to get his plans adopted.

But the comptroller, Mr. C., disagrees:

"Sorry, Joe, amortization doesn't add up on the type of equipment that you have planned for No. 3 plant. Based on payroll savings, it would require longer than company policy permits. As you know, cost of the equipment installed must not exceed a five-year payroll savings in the payments to workers replaced."

But Joe doesn't concede. "According to my checked and rechecked calculations," he says, "the new equipment will cost $81,000. And that figure safely covers installation costs. Actually, the cost of the labor replaced during the five-year period would be $99,750. The amortization period, therefore, is approximately four years and a couple of months—well under the time required by policy."

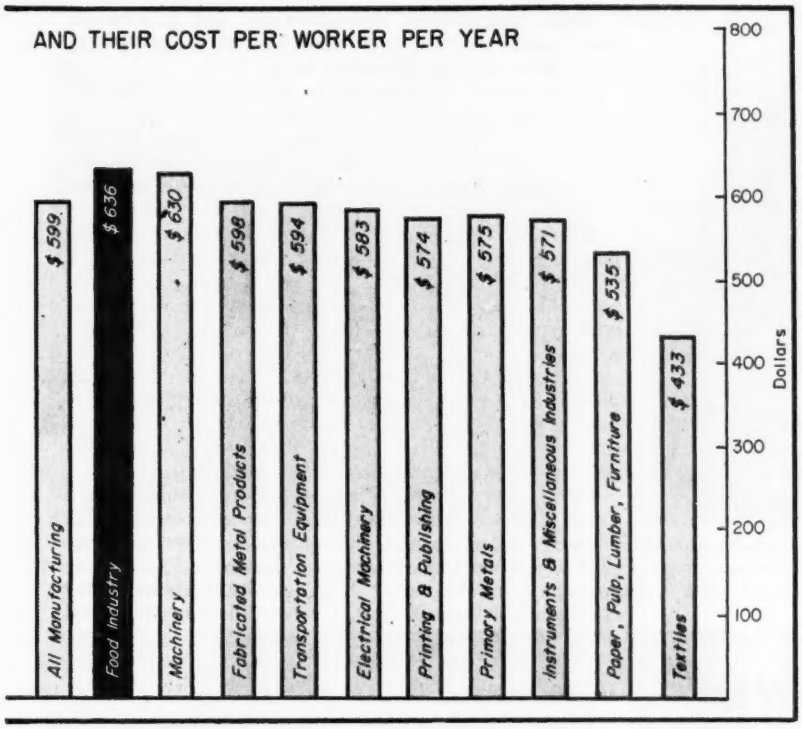
Mr. C. stands his ground: "Not by my figures, Joe. Last year the payroll cost for each of these 5 workers was $2,954. And five times that amount for five years is only $72,850."

Joe is still determined. "But, Mr. C., you did not include the $636 a year we pay each of those employees in *fringe benefits*. Add this *hidden* cost to the $72,850 payroll cost and the actual price of their labor figures out at $99,750. Now, these amounts for fringe-benefit costs came from our director of industrial relations, Mr. R. He's here, and he'll verify them."

Then Mr. R. speaks up: "Joe's right. The average cost of these workers is $3,950 per year, not $2,954. Of course, I don't intend in any way to discount the values of these fringe benefits. Nevertheless, whatever the morale values, the money thus spent must be considered as paid to workers. The total must be added to the cost of our products and passed on to the buyers as a increment of the selling price."

"However," continued Mr. C., "before a decision is made, careful consideration must be given to the effect on all workers when a few of them are dismissed."

"Wait a minute," interjects Joe, jumping to his feet, "The men on that line are too valuable to be let out. They are experienced and loyal or they would not have stuck on their back-breaking jobs so long. There is a place in the company for every one of them. In fact, several departments



WAGE SUPPLEMENTS: About half as much as total wage of 25 yr. ago.

have already spoken for them the minute they can be transferred. Sure is better to keep the old hands than hire and train a new crop of greenhorns!"

Trend of the Fringes

In any event, Joe got his new equipment. And the company, prodded by the comptroller, then began to give serious thought to the cost of, and the trends in, extras and supplements to wages.

This case history is not fiction, though the company's name is not mentioned. In fact, its counterpart has occurred in the modernization and expansion projects of many food companies. Unfortunately, in too few instances have cost-and-saving estimates been based on the true price paid for labor.

The fringe benefit is no newcomer to the food field. On the one hand, it has been adopted as "good business." On the other, it may have represented a sincere determination to better the lot of the company's workers. At any rate, several food manufacturers had, years ago, voluntarily introduced some types of "extra compensation" for their employees, and at calculated costs.

However, only a relatively few years ago, it still was a rare food company that contributed financially (beyond wages) to worker income or welfare. In contrast, we find today that special payments to employees aside from, and in addition to, wages, are legally required of all food manufacturers. The trend in dollars-and-cents costs of fringe benefits is steeply, and probably dangerously, up.

Face the Facts

By 1950, salaries and wages in the food industry had increased 197% above the 1929 level, while supplements rose approximately 1,200%. Recent trend is still accelerated. Benefits paid by food companies (as covered in a study made by the Chamber of Commerce of the United States) were 12.6% of payroll in 1947. Payments by the same companies in 1951 were 17.7%. This latter percent represented an average of 29.5¢ per payroll hour.

At present, total fringe benefit payments by business and industry is estimated at approximately $2 billion per year. Many of these "payroll supplements"—which in fact are wages—are hidden, not only from those who receive them but also from most managements that administer them. In many operations even cost accountants may find difficulty in accurately determining man-hour or even annual pay rate costs of some supplements.

No estimate of the number of different fringe benefits can be accurate for long, since new ones are constantly "invented" and added to the list, now well over 200. Here are just a few of them: Premiums for holidays worked, regular pay for holidays not worked, overtime premiums, travel pay allowances for production work, isolation pay, premiums on hazardous work, shift differentials, payments in lieu of vacation, bonuses, special awards, payments to union stewards.

In view of the softer economic conditions it is unlikely unions can expect much in wage increases in renewed contracts—not that they won't demand them. Rather, they will hope to compromise on new supplements or increases in those now in force.

Therefore, it not only is advisable that a company know the actual cost of each benefit and the total supplement payments in cents per hour and dollars per year, but a real attempt should be made to determine the values of each in terms of cost. And this information, once obtained, should not be buried in a report to the president, but should be drilled into the thinking of all management and also constantly and thoroughly merchandised to all workers.

Had this latter been done, the present general attitude of workers—that benefits and supplements are their inherent rights—might be different.

When supplements were added one by one (often in lieu of wage increases), they no doubt accomplished their objectives—recruiting and maintaining competent workers . . . reducing turnover . . . lifting morale . . . reducing accidents and their attendant costs, etc. It is axiomatic, however, that when all concerns in an area offer the same inducements, many of the former advantages of the benefits evaporate.

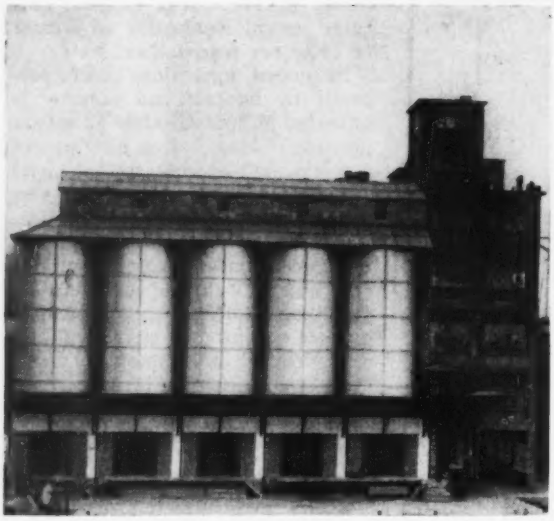
KEY QUESTIONS

- **Are supplements wages?**
- **What are their costs in terms of cents per hour, dollars per year, and percent of payroll?**
- **Are they inflationary?**
- **Did they once have merit? Do they now? Will the values remain tomorrow?**

Effect of Government and Unions

Many fringes now in force came into being as a direct reaction to government ceilings on wage increases. Management then made financial in-

(Turn to page 170)



CORN for new 5-story mill (right) is supplied from 20 steel tanks. Planned expansion calls for 40 more.

Bogota Brewer *Clinches* Grit Quality

Erecting its own corn mill to service far-flung plants, South American company achieves over 74% yield of low-fat, high-convertible starch content grits through use of advanced degerminating process

J. L. NEENAN

Processing Machinery Department, Allis-Chalmers Mfg. Co., Milwaukee

In recent years, special corn grits, like "tailored" malt, have been demanded by many brewers. These grits generally are "quality specified" as a fine screen mesh product with high convertable starch and low oil content—available usually at premium price from regular sources.

At Colombia Breweries Inc. (Consorcio de Cervecarias Bavaria S.S., Bogota, Colombia) this problem was accented by the great distances from major milling sources to the company's 18 breweries. So in 1951 the organization built its own central degerminating facility—reputed to be the first of its type in South America.

Today, this near-automatic corn mill easily meets the needs of the company's many far-flung brewing plants by operating 23 days (8-hr.) per month. Its average monthly output equals 700 metric tons of grits. Yield is 74-75% by weight of raw corn processed.

Aside from desired high-uniformity and plus-income from hominy feed, this installation has thus created a yield 4-5% above similar operations in the U. S.

It was actually shortcomings in national distribution facilities that spurred this development. Unlike the U. S. Colombia can only "swing" truly effective beer distribution in a small area around the production site. Hence the company found it necessary to operate 18 scattered breweries and 9 malting plants.

Combined throughput of these small breweries was large, however—7 million dozen 12-oz. bottles per month or about 2¼ million bbl. per year. And this further accented need for a modern high-capacity corn mill, if economical production of the ingredient was to be considered.

In 1950, Srs. de la Cuesta and de Toro, respectively, vice president and chief engineer of the company, spent several months in the U. S. visiting and studying corn mill operations. A contract was then awarded to Allis-Chalmers for complete mill design and supply of equipment.

Erection of the new mill was carried out under supervision of Sr. de Toro and all work was done by Colombia engineers and mechanics. Sheet metal for spouting, blowpipe, and other detailed parts, was shipped unfabricated to conserve space and reduce shipping costs. Parts were then constructed in accordance with detailed drawings furnished under the contract.

Major Change

The new Colombia plant utilizes a 200-250 bu. per hr. capacity vertical degerminator, which constitutes a major change from standard corn milling systems. Because of its breaking and rubbing effect, it does a more complete job of scouring off the bran or hull and loosening the germ from the starchy portion of the corn. This puts the grain in better condition for subsequent processing.

The degerminator is a modified attrition mill with the disintegrating plates operating in a horizontal rather than a vertical plane as is the case with most such units.

Plates are 36 in. dia. with interlocking rows of pyramid-like studs. Rotating plate, operating at 860 rpm., is mounted on a special shaft of the 40-hp. motor. Stationary plate is in enclosed head through which tempered corn is fed. Clearance between plates is adjusted by raising or lowering the motor.

Working pressure is against a spring adjusted by a hand wheel which in turn, is locked in position by another hand wheel. A quick throw-out lever is provided for instant release of pressure in case of a choke-up, and for quick return to the operating position.

To obtain desired grit fineness, a gradual reduction with many separate grindings and boltings is used. Gyratory sifters make the various separations, with additional aspiration required between each sifting and grinding operation.

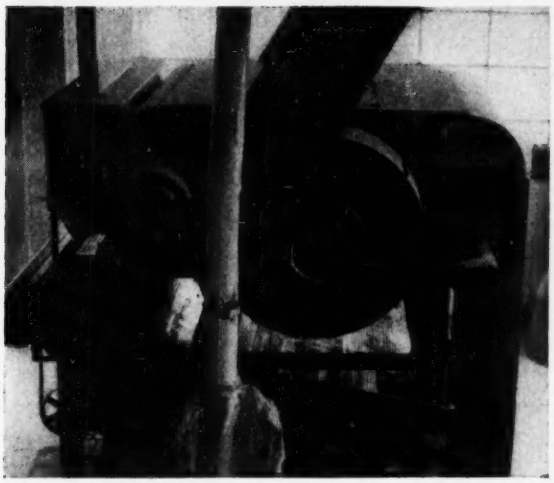
Oil Possibilities

Initially the mill was designed to operate without reclaiming oil, but an expeller is planned as a near-future addition and easily fits into the flow scheme.

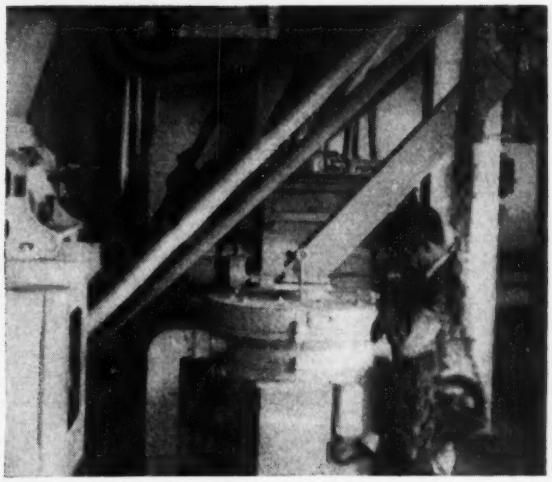
An efficient corn mill can produce upwards of 6/10 lb. of oil per bushel ground, with extraction of a full pound per bushel a possibility under top conditions. The latter yield can easily offset a major portion of the corn milling costs.

To secure this oil, a proportion of the germ is collected, dried, and passed through a continuous screw press. Expelled oil is then settled, filtered, and bulk-stored prior to sale to manufacturers of edible oil and cooking fat.

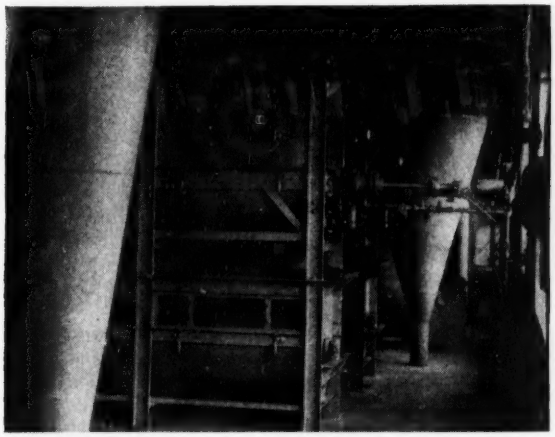
Operation Highlights



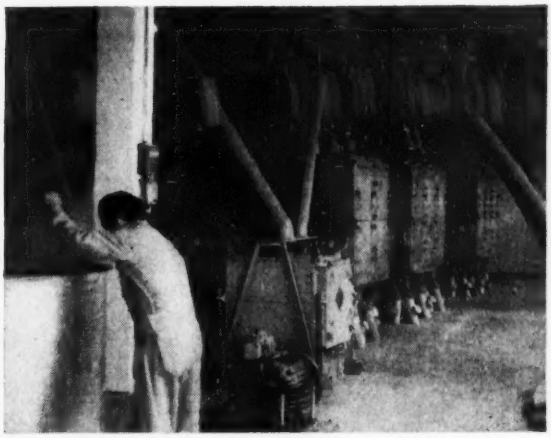
INCOMING GRAIN passes through this receiving separator to remove screenings and large foreign material. Weighing and water tempering follow.



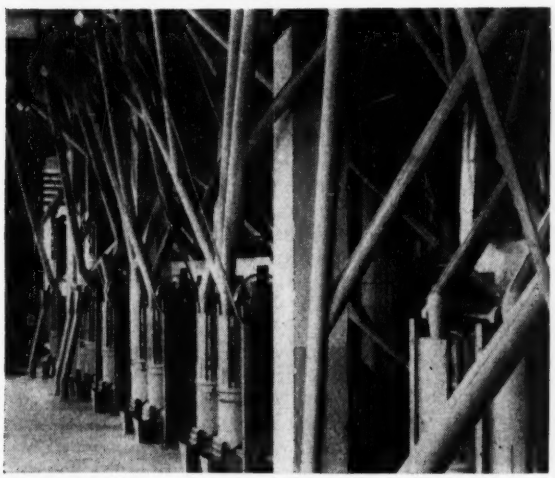
DEGERMINATING unit loosens bran and germ from starchy part of corn by direct impingement against its horizontal rotating studded plate.



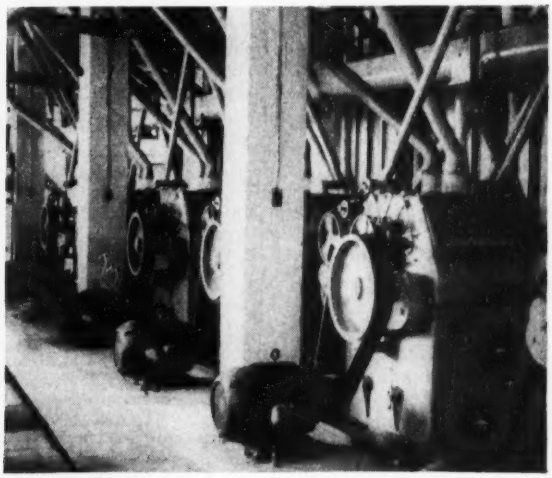
HORIZONTAL rotary dryers and coolers located on top floor prepare degerminated grain for subsequent grading and milling. Note metal dust collectors.



FREE-SWINGING and gyratory sifters remove fine material produced by degerminators. Portion of steaming unit which precedes degermination is at left.



ASPIRATORS separate bran from starchy component by passage through a strong air current. One of the corn tempering tanks is seen in background.



ROLLER MILLS are independently motor driven. Four break-type, three germ, and three finishing rolls are able to handle almost 4 metric tons of grits per hour.

PEELED AND BAGGED, potatoes are readied for shipment in this 40-deg.-F. cooler. Consumer need only boil, bake, or fry. Here, President Jules Salzbank, and Moe Kimmel, his vice-president, check outgoing lots.

Potato Peeling Spurts

On Continuous, Company-Built Production Line

Brooklyn firm designed its washer, lye peeler, acid and sulfite dip tanks, trim table, and separator to handle 12,000 lb. of spuds hourly.

JOHN V. ZIEMBA
Associate Editor, "Food Engineering"

In the rapidly growing convenience sphere, a No. 1 rating goes to the pre-peeling of potatoes for institutions and restaurants. It's sure-fire in providing outstanding benefits for both the food processor and user.

As for the processor, he's carrying out a profitable business of pre-peeling spuds in one spot and on a large-volume basis, employing specialized techniques and equipment.

As for the user, he's spared the time and kitchen-labor involved in tedious peeling. And there's no more messy disposal of trimmings.

Making a notable success with this venture is Potato Service of New York, Inc., now peeling 120 bags (100 lb.) an hr. in its Brooklyn plant.

Success primarily has been due to—

1. Fulfilling its customers' ultimate requirements for uniform, high-quality "pommes de terres" for baking, boiling, and frying purposes.

2. Making wise decisions in purchasing potatoes at the right market price, for most healthy profits.

How About the Housewife?

Food processors have long considered the potato-peeling plight of the housewife. About 7 yr. ago, they offered frozen French fries and mashed potatoes. Now they're coming out with dehydrated mashed potatoes that take but a jiffy to reconstitute with hot water.

But how about pre-peeled potatoes in consumer-size packages? They could be made available—if retail stores had sufficient space in refrigerated display cases. They haven't such space, however.

To get around this problem calls for improvements in process techniques. Could the answer lie in shooting slugs of SO_2 in gas-tight bags of pre-peeled potatoes? Or treating them with unobjectionable bacteriostatic compounds? —The *Editors*

3. Adopting straightforward engineering techniques in the installation of a flexible, continuous peeling line and in the development of its own equipment.

Quality was assured by instituting an advanced system incorporating constant attention to the potatoes all the way from purchase, through processing, to the consumer.

Sharp-eyed inspecting and sampling of lots before purchase enables this firm to obtain the best spuds for efficient handling through its production line at minimum waste. Quality of samples are then evaluated at the plant by simple cooking tests involving the preparation of boiled, mashed, and French-fried potatoes.

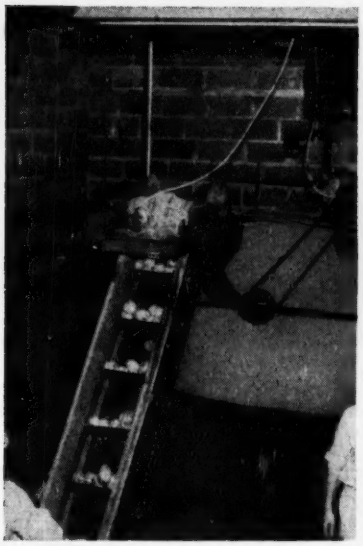
Preferred, of course, are the top-soil growing varieties—those with shallow eyes like the Chippewa, Katahdin, Sebago, Russet, and Kennebec. Such potatoes entail least time and labor on the trimming table, with waste very low.

Trimming losses conventionally run from 10 to 30%, depending upon size and quality (freedom from mechanical injury and diseases) of the potatoes.

There's no need of purchasing un-

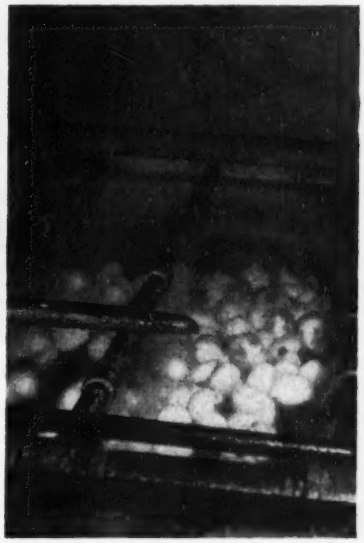
(Turn to page 216)

8-Step Process Engineered by PSNY

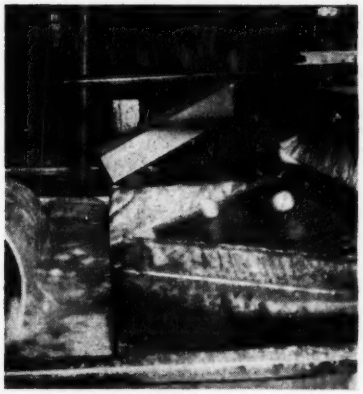


1 **ROTARY** washer cleans spuds as they are tumbled in warm detergent. Solution is changed four times.

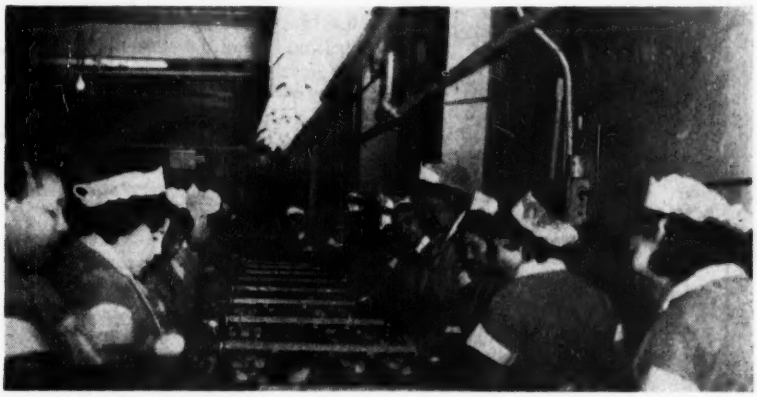
2 **WASHED SPUDS** are conveyed to non-stop, rotary peeler that's partially submerged in 20% lye.



3 **RUBBER ROLLS** and high-pressure water sprays remove loose peels from spuds leaving lye peeler.

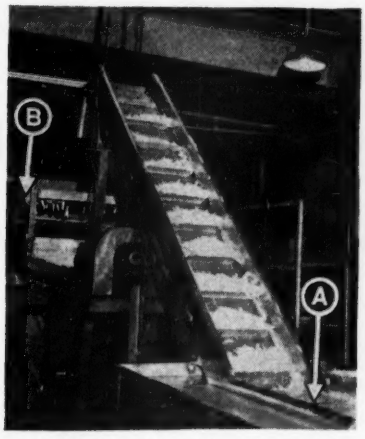


4 **A 30-SEC. DIP** in 2% citric acid solution removes excess lye from potatoes, prevents discoloration.



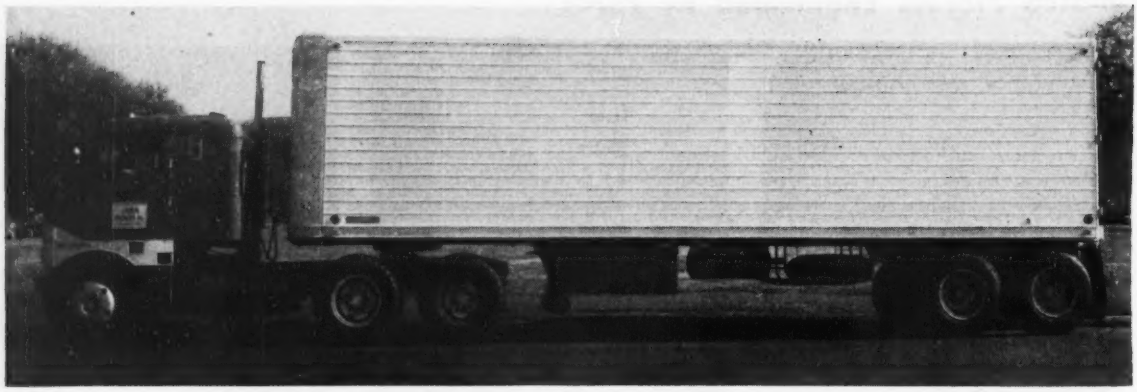
5 **CREW** of girls on 50-ft. trimming line cut away dark spots remaining around eyes and also discard bad spuds. Meanwhile, trimmed potatoes are graded into two lots—for whole spuds and French fries.

6 **SHORT DIP** in 1.5% sulfite bath prevents further chance of enzymatic discoloration of potatoes.



7 **LEAVING** slicer, French fry strips are again dipped in sulfite bath (A) on way to vibrating screen (B).

8 **FRENCH FRIES** are chuted from screen separator (left) to dual bagging station.



Continent-Spanning Rolling Refrigerator . . .

Mounting of constant-running Transicold unit beneath floor of trailer is shown in this full-length view. Equipment is Kenworth cab-over-engine diesel with tandem rear axle and 35-ft. Trailmobile tandem trailer.

. . . And Its Notable Sub-Zero Runs

Map of the two far-ranging test trips. Dash line traces journey with 30,000 lb. of frozen turkeys from Modesto, Calif., to Medford, Mass.—3,340 miles. Solid line shows return run (2,540 miles) from Plymouth, Fla., to Los Angeles, carrying 1,500 cases (some 35,000 lb.) of frozen concentrated orange juice.

5,880-Mile Deep Freeze Chalked Up by New Road Reefer

A NEW TYPE refrigerating unit, already successfully pioneered on the West Coast, now has been proved effective for long runs.

Two exacting test trips, under auspices of USDA, have demonstrated satisfactory maintenance of sub-zero temperatures for frozen food products carried in both directions across the continent.

On the first of the two runs, 30,000 lb. of frozen turkeys were carried from Modesto, Calif., to Medford, Mass., approximately 3,340 miles. Then, on the return trip, the same tractor-trailer hauled 1,500 boxes (about 35,000 lb.) of Minute Maid orange juice concentrate from Plymouth, Fla., to Los Angeles—2,540 miles.

The eastbound run has been officially documented in the USDA interim report, *Test of a Mechanical Refrigeration Unit to Maintain Low Temperatures in Motor Truck Trans-*

portation, prepared by Harold D. Johnson, Marketing & Facilities Research Branch.

No USDA representative was on the return trip. But Department personnel recorded product temperatures at the time of loading and unloading. And data given here was verified by J. A. Podmore, general traffic manager of Minute Maid Corp., at Plymouth.

A Look at New Unit

The mechanical refrigerating unit under test was the Transicold Model IR-101, made by the Transicold Corp., Los Angeles. It differs from machines put on runs in the East and Midwest in these principal respects:

First, the engine, generator, compressor, and condenser, along with the engine fuel tank, are mounted together under the floor of the trailer. Second, the engine is run continuously, with the refrigeration controlled by modulating speed of the engine instead of by "off" and "on" cycles. In the eastbound run with the turkeys—stated in the USDA report to have proved the effectiveness of the unit—average temperature of cargo at loading in California was −16 deg. F. And just before unloading in Massachusetts it was −13.4 deg. F.—a rise of only 2.6 deg.

Difficulties Licked

This notable performance was chalked up despite mechanical difficulty enroute with a valve in the refrigerating system. Average load temperature rose nearly 3 deg. before the difficulty was remedied. But then the system reduced average temperature some 11 deg. in the following 4 days—a demonstration of the capability of the system.

Furthermore, mechanical difficulties with the tractor pulling the test trailer caused considerable delay, hence elapsed time between departure and destination was 11 days.

During this period outside temperatures were relatively low, running down to 41 deg. F. Hence, USDA recommends further test during extreme summer heat.

The report also suggeests that the clearance around and under the load be increased so as to maintain more uniform temperatures throughout.

Orange Juice Test Run

On the westbound run of frozen orange juice concentrate, shipment temperature was −4 deg. F. at loading and −20 deg. F. at unloading.

The reported box temperatures enroute varied from a low of −25 deg. F. to a high of −19 deg. F. Outside temperature ranged 50-72 F. Time for the 2,540-mile run, which suffered no delays, was 4 days, 18 hr. Again, ability of the unit to maintain desired low temperatures was proved.

In summarizing on the orange juice haul, Mr. Podmore remarked the fact that the motor haul is much faster than rail, which runs 9 to 14 days. However, he pointed out that the cost by truck is considerably higher. The test run was specially made by the owner of the equipment at rail rate.

It is noted that two motor common carriers, have established an interchange rate—Florida to Dallas and Dallas to Los Angeles—at $3.75 per cwt., as compared with a rail rate of $2.45, which includes salt and ice charges.

Buy Four Units

So, except where time is a factor, the motor run could not feasibly be operated in competition with rail by motor common carrier. However, operation by a company of its own fleet, and with management for return loads, is seen compensating on costs. And as a result of the test, Minute Maid has purchased four Transicold units for its own fleet, considering this type of equipment superior to others so far tested.

While maintenance of adequate subzero temperatures primarily is based on an adequate refrigerating system, there may be adverse effects due to insufficient insulation and improper loading. Hence, these latter factors are of important concern in achieving optimum operation.

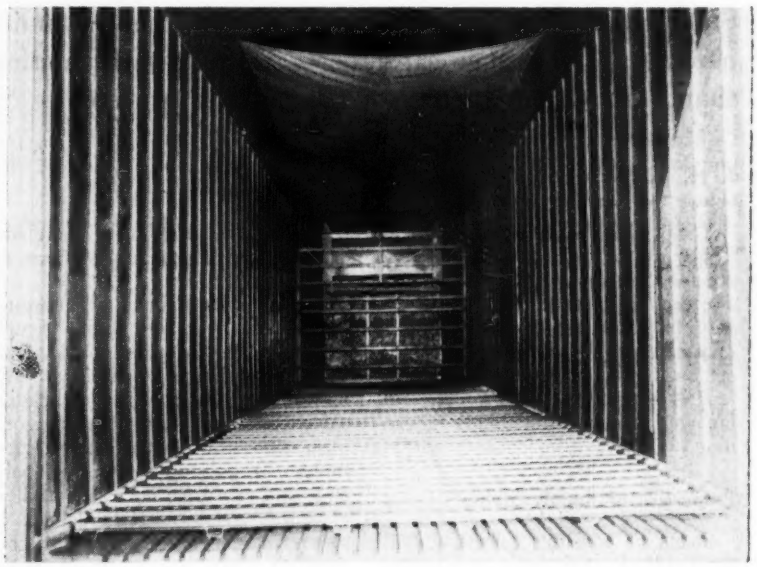
The tractor was a Kenworth COE (Cab over engine) diesel. And the trailer was a 35-ft. Trailmobile tandem with extruded aluminum floor and with 6 in. of Ultralite glass fiber insulation all around. Both tractor and trailer were owned by the Jaka Packers, Inc., of Los Angeles. The runs were made under a special test permit issued by the ICC.

The insulation included three sheets of double reflection paper, with a 3-in. layer of the insulating material between each sheet. The first sheet was next to the outside aluminum skin of the trailer while the third sheet was between the insulation and the inside marine-plywood wall. Doors were similarly insulated and had triple rubber seals.

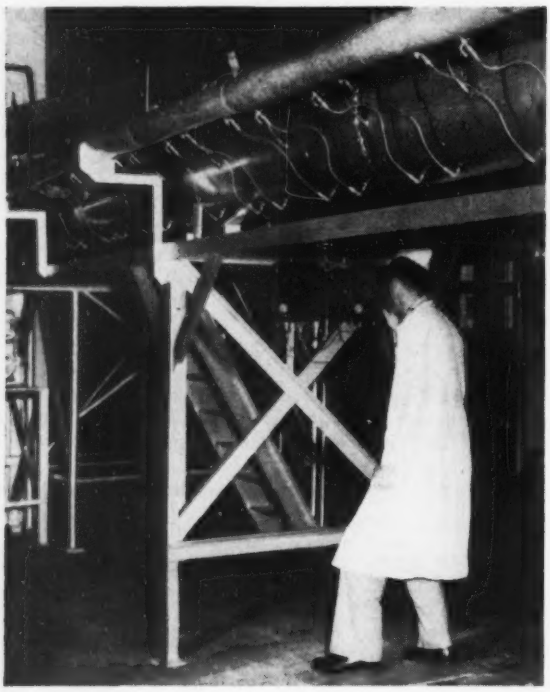
Vertical wooden battens, 1¾ in.

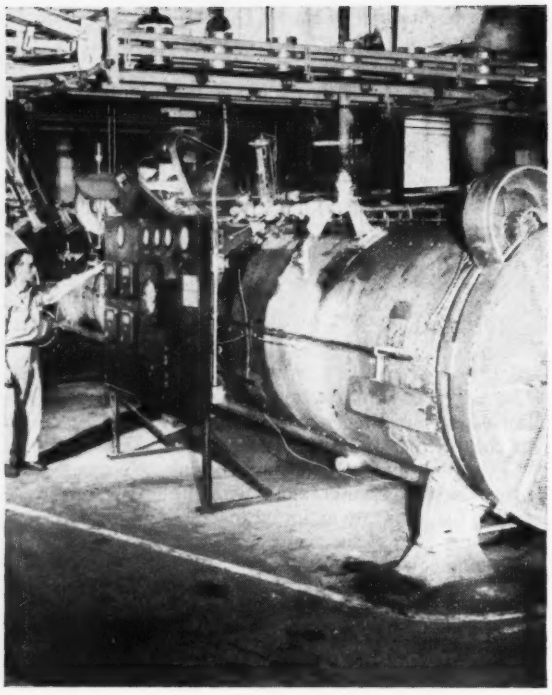
(*Turn to page 224*)

CLOSEUP OF NOSE of reefer trailer. Driver is taking out day's interior-temperature chart on westbound arrival at Los Angeles.



INTERIOR OF TRAILER, viewed from rear. Evaporator is at top, far end. Note vertical side battens, also removable aluminum floor racks laid over slotted-aluminum floor. To assure full air circulation to rear of trailer, special canvas sheet is suspended from ceiling.





TYPICAL TASKS

PREPARING FOODS: In this continuous blancher, steam at approximately 125 psi. is employed as heating medium.

STERILIZING FOOD: In continuous, automatically controlled pressure cookers, cans are steam heated.

Prime Pointers on Generating and Using

PROCESS STEAM

Supply properties . . . equipment types . . . fuel . . . units needed . . . and their capacities—are factors demanding sharp attention to assure top canning performance

J. H. BOCK and LAWRENCE NEWSOME
Research Div., Continental Can Co., Inc., New York City

Today, efficient generation and effective use of steam are "musts" for the food processor who aims to survive economically. They are vital not only to attain maximum output at minimum cost but also to assure product quality.

Here are major criteria in determining your steam requirements in canning.

Properties of Supply Steam

Steam at pressures consistent with the needs of various unit operations is primary. In general, line pressures of 100 to 125 psi. are satisfactory for most operations, provided the boiler is properly sized and the lines are adequate to carry the amount of steam required.

Attempts to operate at pressures substantially under these figures usually result in questionable practices or inefficient operations. The retorting is particularly vulnerable, since it is almost impossible to accomplish sufficient venting at pressures under 70 psi., unless exceptionally large and expensive lines are installed.

"Pure" steam may be defined as steam free of air or other noncondensible gases, condensible volatile materials other than steam, excess condensate, and entrained solubles, such as boiler compounds and salts. It is this pure steam that is necessary to preclude the possibility of faulty retort operation, contamination of the products involved, and corrosion or other damage to the container.

While it is extremely unlikely that any steam supply would carry enough air or other gases to affect the efficiency of a thermal process, some steam supplies may become sources of product contamination when they carry certain volatiles, excess condensate, or soluble materials.

All too often, soluble corrosive materials carried from boilers in entrained condensate are responsible for container corrosion, discoloration, and damage to outside enamels or lithography during retorting. Presence of these materials is usually due to faulty practices in boiler operation, such as excessive use of boiler compounds, high concentrations of salts in the boiler water, and high water levels.

All of these practices are conducive to "priming," the main cause of liquid carryover. Periodic draining and

flushing of all steam lines with fresh water usually will prevent an accumulation of corrosive materials that may have been carried over into the steam lines.

Steam Production

Boiler or steam generator capacities often are listed in terms of boiler horsepower. This value may be defined in terms of the ability of the unit to change approximately 34 lb. of water at 212 deg. F. to steam at 212 deg. F. It has been common to rate a boiler on the basis of 10 sq. ft. of heating surface per boiler hp. With improved firing methods it was found that a boiler could develop considerable more than "rated capacity."

Rating according to heating surface therefore has become obsolete, although it is still used occasionally with reference to standardized boilers of lower capacity. Most common term used today is the number of pounds of steam per hour that the boiler will produce under a specified set of conditions.

Steam generation equipment may be classified into two general types—*firetube* and *watertube* boilers. These, in turn, may be obtained in several different styles.

The first-named type, either in the horizontal return tubular or Scotch marine styles, most commonly is used, particularly in seasonal operations and primarily because of lower initial cost. This firetube type generally is operated at rather low pressures, usually not over 150 psi.

The watertube type, in contrast, usually is used in larger installations involving year-'round operations and where large amounts of steam are required, also where very high boiler pressures can be employed.

Either type may be operated at something over its nominal rated capacity, the degree of overload depending upon design, setting, fuel, and other factors. One advantage of firetube boilers is the large water-storage capacity. Because of this feature, wide and sudden fluctuations in steam demand are met with little change in pressure. Watertube units, on the other hand, are capable of considerably higher overloads, both continuous and intermittent.

The knowledge that boilers can be operated in excess of rated capacity quite often results in an installatoin that is undersized—too much faith being placed in the possible overload and not enough consideration being given to loss of efficiency over extended use and expansion of operations.

Undersizing may occur where steam "generators" or "package" units are used, since in general they are compactly constructed for limited space requirements and ease of installation, but usually with no provision for overloads. However, there are some self-contained boiler units designed to provide for considerable over-load capacity.

Fuel is an important consideration in selecting a boiler. The choice of fuel usually resolves itself into a matter of economics, and no general rule appears to be applicable for all localities. In some circumstances a change in fuel and/or firing method can increase steam output. Oil and gas-firing systems require less attention and maintenance and are cleaner than most coal-fired installations. Gas is preferable to either oil or coal if the cost permits, since here there is no problem of material storage or waste disposal.

The One vs. the Many

Another problem is that of single as against multiple installations. This question almost always arises whenever new steam plants are being considered, and it requires careful analysis of the intended operations, particularly with respect to possible demand variations.

Usually, if over 6,000 lb. of steam per hour are required to handle peak demands, with very low off-season demands, multiple installations should be considered. If a boiler should fail in the case of dual installations, it usually is possible to operate with one unit until the failure is rectified. This commonly requires very careful juggling of certain operations. But is can minimize the losses resulting from a complete shutdown.

Careful analysis, by competent personal, of cannery-steam needs and operating requirements of individual units is necessary to assure selection of a steam plant that most efficiently will supply an adequate amount of steam as needed. A well-engineered steam plant can contribute much in reducing production costs.

Consumption and Demand

In determining size or capacity of boiler installations, principal consideration must be given to peak demands of various operations, including the number and frequency of these demands. The peaks may differ greatly from common operations, and it is imperative that sufficient steam supply be available to preclude possibility of affecting the efficiency of other operations that may be going on at the same time as the peaks.

Besides having ample boiler capacities, steam lines satisfactory for the peak demands of the various operations must include proper insulation to protect against condensation.

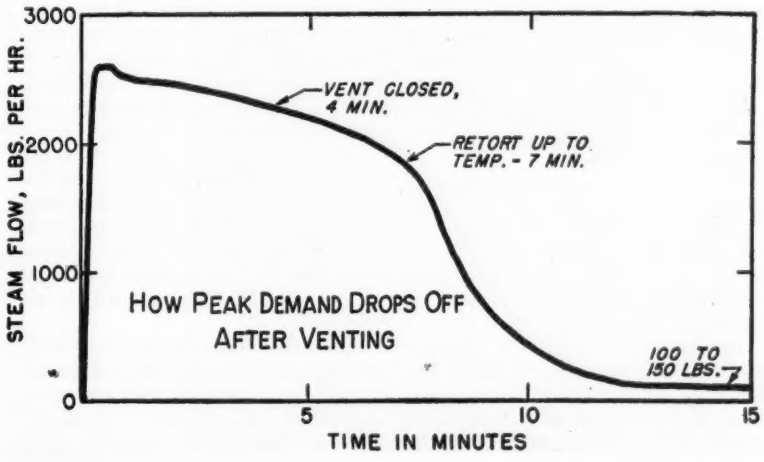
Installation of steam traps where possible will help reduce demands on boilers, since they allow for better utilization of the potential heat in the steam. It is very important that traps be properly sized to insure adequate condensate removal.

Probably the best example of the wide variance between peak demand and operating demand is in retorting. Here, peak occurs during the venting period. It may vary between 2,500 and 6,000 lb. per hour for a standard 3- or 4-crate retort, depending upon size of the steam inlet line.

Peaks for 1-in. inlets will reach a rate of approximately 2,500 lb. per hour; 1¼-in. 3,500; 1½ in., 4,500; and 2 in. about 6,000.

Roughly one-fourth to one-half of the total steam required per charge is used during the venting, varying according to the venting cycle required for each installation. The demand drops off rapidly to 100-150 lb. per hour after the vent valve is closed and the retort reaches operating temperature (see graph).

Average steam consumption for a full 3- or 4-crate retort for processes up



Steam Consumption and Flow

TABLE I—FLOW-METER MEASUREMENTS of Steam for Various Products

Product	Lb. of Steam Per Case: Preparation	Retorting	Total
Asparagus cuts, No. 2's Cannery A	16	7.8	23.8
Asparagus cuts, No. 2's Cannery B	13	5.1	18.1
Asparagus cuts, No. 10's Cannery B	17.2	6.7	23.9
Corn, whole grain in brine, No. 2's	3	6.3	9.3
Corn, cream style, No. 2's	10	6.6	16.6
Peas, No. 2's	8.3	6.5	14.8
Apple slices, No. 10's	....	...	32
Applesauce, No. 10's	....	...	20

Note: Values listed for retorting operations are considered consistent for products involved, with an average of 6.5 lb. of steam per case of 24 No. 2 cans. This has proved a good figure for estimating steam requirements, also is consistent with total of 250-300 lb. of steam per retort.

TABLE II—APPROXIMATE REQUIREMENTS for Unit Operations

Unit Operation	Peak Demand (Lb. Per Hr)	Operating Demand (Lb. Per Hr)	Av. Lb. Steam (Used Per Case)
Retort 1 in. steam inlet	2,500	100–150	6.5
1¼ in. steam inlet	3,500	100–150	6.5
1½ in. steam inlet	4,500	100–150	6.5
2 in. steam inlet	6,000	100–150	6.5
Continuous pressure cooker	6,000	1,000–1,500	3.5–4.0
Open kettle (212 deg. F.), processing 60 min	2,000	100–200	2–5
Blancher, reel	3,000	1,000	5–6
Blancher, tubular	3,000	1,200	5–6
Flash sterilizer (30 gpm.)	950	750	1.8
Open kettle concentration of tomato puree—1.045 sp.g.	6,000	5,000	49 (6–10's)
Brine heating (60 to 200 deg. F.)	.....	...	3
Double batch mixer, cream style corn	1,800	750	3
Exhaust box, steam (4x20 ft.)	500	500	3 (6–10's)

to 60 min. will vary from 250 to 300 lb. of steam, or approximately 6 lb. of steam per case of 24 No. 2 cans. There is no significant difference in the requirements of 3- and 4-crate retorts or hot and cold retorts.

Because of the high peak demands for individual retort come-up, care must be exercised in timing these operations in order to prevent excessive demands upon the steam generating system. Unless the system is overburdened by regular operations, an efficient generator usually will recover after such demands with no appreciable pressure drop at the boiler.

In order to minimize the effect of pressure drops in boilers operating at near peak capacity, it is sometimes desirable to install a reducing valve in the boiler header. Thus allowing the boiler to be operated at something greater than line pressure, this acts as a reserve steam supply.

Other equipment may have rather high peak demands at the start,—as, for instance, a blancher, where it is necessary to heat a sizable amount of water to blanching temperature. Peaks of this nature offer no problem, usually being met before actual plant operations start.

Table I gives steam consumption values, expressed in pounds of steam per case of product. Here, figures are based on actual flow-meter measurements made in canneries during conventional operations.

Approximate consumption requirements, based on values for some of the more significant unit operations, are given in Table II. Data are in pounds of steam per hour, with averages based on a case of 24 No. 2's, or otherwise as indicated.

In calculating consumption requirements for a cannery, knowledge of the demands, both peak and operating, is essential for each piece of equipment using steam. If this information is not available, some means of estimating it is necessary.

TABLE III—FLOW OF STEAM Through Orifices (lb. Per Hr.)

Steam Pressure Psi. Gage	Size of Orifice: ⅛ In. (.01227 Sq. In.)	7/64 In. (.02671 Sq. In.)	¼ In. (.049 Sq. In.)	5/16 In. (.110 Sq. In.)	½ In. (.19635 Sq. In.)	¾ In. (.4418 Sq. In.)	1 In. (.7854 Sq. In.)
5	7	20	38	80	145	315	580
10	10	30	52	120	216	480	850
20	14	40	76	175	316	690	1230
30	20	50	100	215	384	840	1510
40	26	60	125	260	450	980	1780
50	33	70	150	300	520	1125	2050
60	38	85	175	345	590	1270	2330
70	44	95	200	390	660	1415	2600
80	50	105	225	430	730	1560	2880
90	56	115	250	475	800	1700	3170
100	61	130	275	520	870	1850	3450

The heaviest demands, associated with retorting, particularly center in retort come-up. This is especially significant if two or more retorts are coming up at the same time. Continuous processing systems tend to eliminate excessively high peak demands, thereby resulting in a lower boiler rating requirement.

Table III lists approximate flows of steam at various line pressures through several size orifices discharging directly to atomspheric pressure. All flows are listed in pounds per hour. This table may be used for estimating requirements for non-standard operations, such as exhausting, blanching, and direct-steam injection heating.

From the number and size of holes through which steam discharges in the equipment, and knowing the line pressure, peak demands may be estimated. Relative to ¾-to-1-in. steam supply lines, the table data can be applied to various units if lines in question are relatively short.

Once unit demands are determined, a complete analysis of the various operations must be made with respect to occurrence and timing of these demands. With this information available, it is fairly simple to sum up all peak and operating demands occurring at any given time, and the highest figure will then be the maximum demand for the operation. From this requirement the steam generating and distribution systems then can be determined.

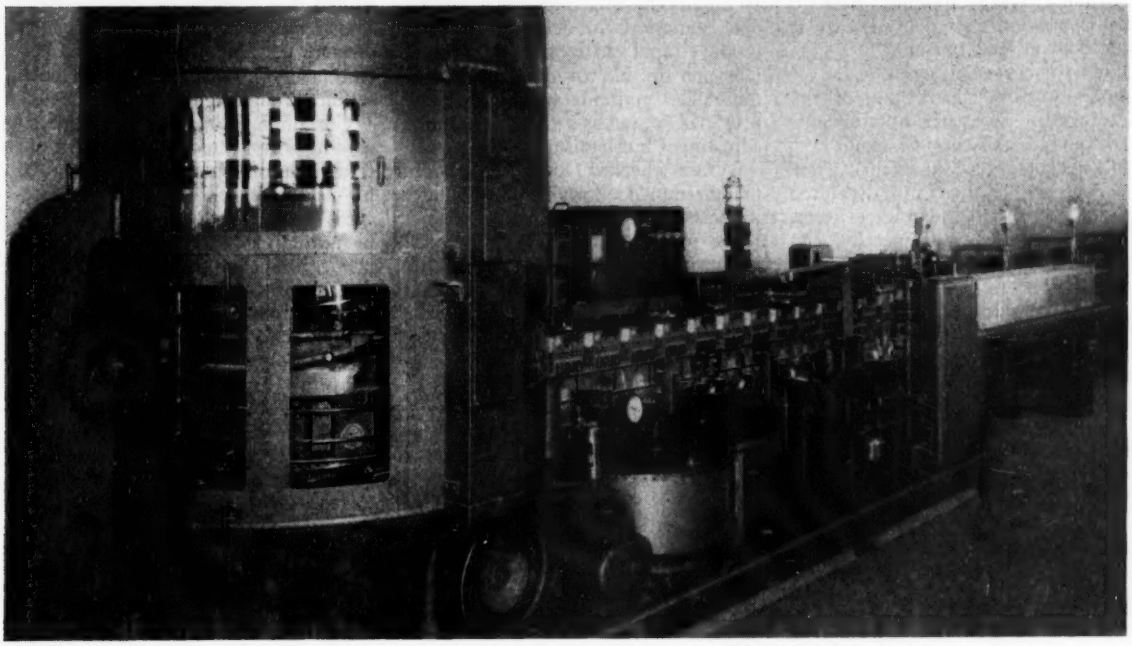
At this point, engineering assistance should be obtained to review the consumption data, determine the best type of boiler and fuel to be used, and to plan a distribution system.

Some consideration also should be given to possible future expansion of canning operations so that provisions can be made for additions to the steam plant. For all too often there has been two little concern for later needs.

Too much accent may be placed upon utilizing all possible capacities from overload with the mistaken thought that the cost of the next size boiler would be prohibitive. This may result in inadequate steam supplies and expanded production costs. It is far better to play safe and oversize.

Above article was taken from address by the authors at the recent Canning Problems Conference of the National Canners Assn. in Atlantic City, N. J.

NEW EQUIPMENT & SUPPLIES



Unit Sets-Up, Fills, Seals, Checkweighs Packages

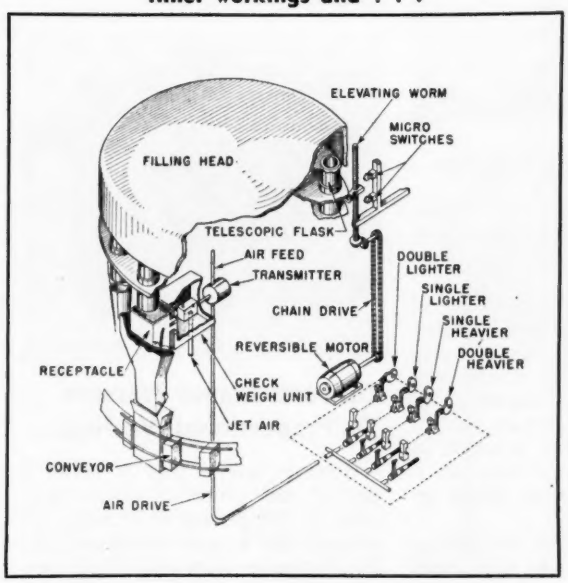
Sift-proof packages are set up, accurately filled, sealed and checkweighed at speeds up to 300 per min. by this new combination high-speed packaging unit.

Known as the Velocitron, the packager handles the following operations: Sets up cartons in continuously moving pockets; seals bottom flaps; measures product by volume; deposits load, and glue-seals top flaps.

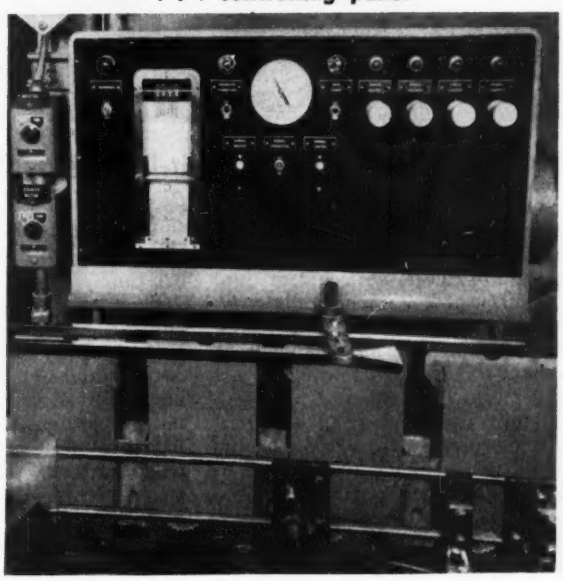
Volume measuring is done through use of adjustable flasks mounted on a turret which rotates in synchronization with carton pockets. There are 12 flasks. These discharge a measured volume of product into cartons as they travel around semi-circular end.

Then too, built into packager is a weight control apparatus having the following components: the Pneumatron, a check weighing device; a volume adjusting unit which, by means of reversible motor, changes volume of all 12 measuring flasks simultaneously; and a combination weight recording and control mechanism which

Inner workings and . . .



. . . controlling panel



acts on signal from check weigher to actuate volume adjusting motor.

Through this system, package weight variation caused by density is reduced by at least one-half.

The check-weighing head is mounted directly below one of the 12 measuring flasks and rotates with it. Product is discharged from flask into a receptacle (see diagram). Here it is quickly weighed and deposited into carton below. The other 11 flasks discharge into their respective cartons independently.

The check weighing receptacle is rigidly mounted to a stiff cantilever assembly of parallel spring bars. Deflection rate is very small (2/to 3/1,000 in. per oz.). Dampers absorb vibration.

Coupled with a small deflection rate, light weight of weighing assembly minimizes momentum. Result is a highly responsive and rapid weighing mechanism. Position of deflected receptacle measures exact weight of goods by commonly used "air gage" principle. Variations in deflected position produce rapid changes in air pressure (lb. per sq. in. for every $\frac{1}{16}$ oz. in receptacle content weight). These pressures are fed as a signal to volume adjustment mechanism.

When checked load varies from predetermined allowable limits, automatic correction of all flask volumes takes place during following turret revolution. One cycle of turret is required for check weighing, second for correction. Thus, complete operation occurs 10 to 12 times per min. or once in every 24 cartons.

Recording and control device receives air pressure signal from weighing head and translates it into action corresponding to weight of measured load. Four timed-electrical switches (see diagram) are actuated by relayed air pressures and control reversible motor which simultaneously adjusts 12 telescoping flasks. Each switch is set to actuate at particular pressure corresponding to weight correction to be made, and reveals such action through light signals on panel.

Continuously fed heat-sensitive recording tape receives imprint-dot from a heated filament pen as each fill load is check weighed. This records actual weight of every 24th fill by noting extend of pentravel caused by air pressure from box deflections.

Control panel is furnished with manual buttons for adjusting flask volume in either direction. As machine is started these controls are used to bring load pattern within limit lines on recording tape. An air gage reveals varying air pressure corresponding to check weights of product.—*Pneumatic Scale Corp., 82 Newport Ave., Quincy 71, Mass.*

Circle 99A on Reader Service Card

Pusher Device Simplifies Unit-Load Handling

Simplified handling of unit loads is reported with use of a newly designed pusher device on hydraulically actuated fork trucks. Attachment provides a means for mechanically pushing a load off a truck's forks and is designed principally for handling loads without pallets. Attachment does not reduce capacity of truck.

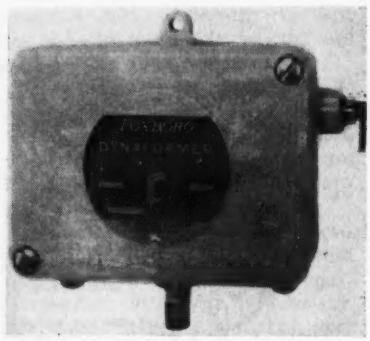
Pusher unit consists of a vertical load screen guided by a pair of pantographs, one on each side. Power to extend and retract screen is supplied by a telescoping, double-acting hydraulic cylinder acting through specially located thrust arms. Use of this type of cylinder gives more stroke with less over-all height and permits tiering in low overhead areas such as box cars.

Forces applied to both sides of pusher screen are equalized by tieing linkage together across face of truck. Actual pushing force is exerted near bottom of load, where required. All pin connections in linkage are of hardened steel and are mounted in hardened steel bushings; each pin is equipped with a pressure grease fitting.

In normal operation, as linkage wears, screen often drops down until it rides on forks. Pinching of load between screen and forks often occurs under such conditions. To eliminate this condition and also problem of rebushing of pins, when bearings are worn a built-in adjustment is provided for maintaining a suitable spacing between screen and forks.

Mechanism for pusher is mounted alongside truck's uprights so that possibility of damage during travel is minimized. Screen itself can be made from bar, screen wire of any mesh, pipe, according to specific requirements.—*Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3.*

Circle 100A on Reader Service Card



Converts Liquid Pressure To Proportional Voltage

Accuracy within plus or minus $\frac{1}{4}$ percent and protection against overrange to 150 percent of its rating are claimed for a new transducer, the Dynaformer pressure cell. Highly sen-

sitive, new element converts fluid pressure into a proportional a.c. voltage which is measured in terms of pressure by an electronic resistance instrument.

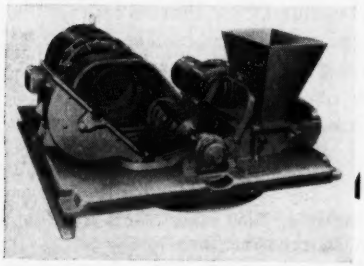
Cell consists of a Bourdon pressure spring linked to a copper ring which surrounds the iron core of a differential transformer. Responding to fluid pressure, the spring positions the ring, inducing a differential voltage in the output winding proportional to the fluid pressure.

A self-contained adjustment enables user to match zero of transducer to that of instrument. Any pressure range between 0 to 30 in. Hg. and 0 to 10,000 psi. is available.

All parts are enclosed in a splash-proof, rubber-gasketed, cast-aluminum case with a pressure-tight cable connection.

All of the electrical components, with exception of iron core of transformer, are embedded in plastic for protection against moisture. Three mounting lugs on case permit cell to be mounted in any position or, if desired, directly on pressure connection.—*Foxboro Co., Foxboro, Mass.*

Circle 100B on Reader Service Card



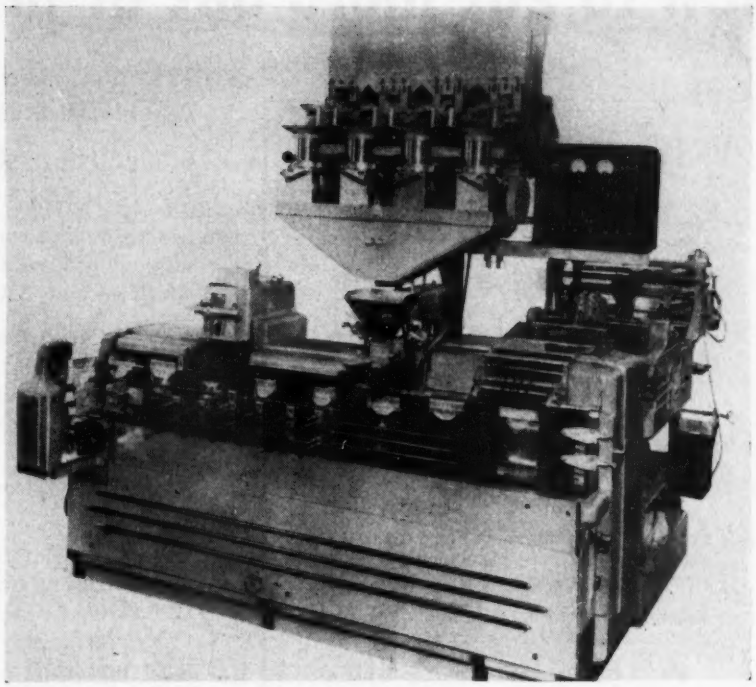
Pulverizer Grinds Foods To Medium-Fine Size

Soft materials, such as food products are readily ground to medium-fine size by this new screen, hammer-type pulverizer.

New mill, called the Ray-Ducer, is available in three sizes to handle a wide range of capacities. New design is very compact. Mill, its feeder, motors and variable speed feeder drive are mounted on a relatively small metal base.

Outstanding feature of mill is its accessibility for inspection, maintenance, and changing screens. New method, used for holding screens, expedites changing them.—*Combustion Engineering, Inc., Raymond Div., 1315 N. Branch St., Chicago 22.*

Circle 101A on Reader Service Card



Automatic Unit Speeds Packaging, Cuts Losses

Increased speeds, reduced labor costs, and minimized product loss in packaging of nuts, candy, rice, macaroni, beans, are claimed with use of this new automatic machine.

New machine can be set up with either net weight or volumetric measuring devices for waste-free filling operations. It automatically forms single or duplex bags from plain or printed roll stock up to 4 x 8 x 12 in., flat or gusset, then fills and seals them at rates up to 35 per min. A "no-bag no-fill" prevents waste.

An electric eye attachment for print registration or label positioning is available as extra equipment, as is an "over-under" checking device. Only one operator is needed to place the finished bags into cartons.

Interchangeable plates in controlled heat sealer unit allow production of either flat or gussetted bags, as desired. A few simple adjustments convert the unit from one type of product to another.—*Simplex Packaging Machinery Inc., Food Machinery and Chemical Corp., Oakland, Calif.*

Circle 101B on Reader Service Card

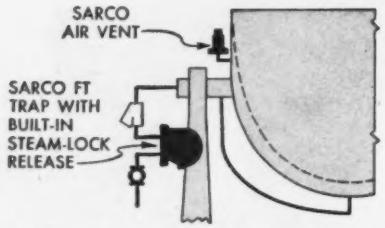
Sanitation Stressed On New Kettles

"Tops" in sanitation is claimed for a new line of large, stainless steel kettles. New units have no flanges, joints, crevices where bacteria or food residue can collect. Further, surfaces of kettles are polished to a high lustre inside and out and their finished surfaces are easily cleaned.

All joints are round and flush inside and out. Cylindrical legs are sealed and adjustable. For permanent installations, floor flanges are furnished.

Kettles in Styles SA and SB are now available. Style SA comes in 15-500 gal. capacities, either ¾ or completely steam jacketed, built for pres-

How to get more out of process steam



This Sarco steam trap and air vent hook-up on steam-jacketed kettle assures quick heat-up and even temperature throughout cooking cycle.

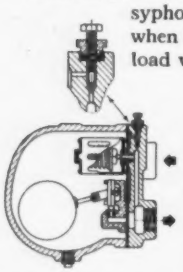
Taking The "Guess" Out Of Kettle Cooking

Problem: To eliminate prolonged cooking time and variations in cooking cycles in steam jacketed kettles.

Solution: Insure consistent and maximum heat transfer by getting rid of:

Air Pockets and Films—Install a Sarco Thermostatic Air Vent in the *right* place to eliminate these heat robbers. Sarco Air Vents discharge air, gases and air-steam mixtures, often 20° F. *below* steam temperatures. Self-adjusting bellows opens vent at slightly below steam temperature.

Waterlogging—Install a Sarco Float-Thermostatic Steam Trap with a built-in *steam lock release valve*. Waterlogging causes low and uneven heat transfer. It occurs when condensate discharge is blocked by steam in syphon pipe; it also occurs when trap can't handle wide load variations.



The float operation of this trap enables it to handle wide variations of load and steam pressure. The steam-lock release valve prevents waterlogging, by completely elminating steam-locks in the syphon pipe.

For complete information on Sarco Air Vents and Traps with integral steam-lock releases, write for literature.

. . . to improve product quality, reduce production costs, eliminate bottlenecks

Make sure the steam traps and temperature controls on your process equipment have been properly specified and installed.

Here's why! Very often when production schedules are upset and steam costs seem relatively high, you'll find the trouble is not with the process equipment . . . *but with the way steam is used!*

Avoid These Production Headaches

The wrong type of trap can cause waterlogging and keep equipment from reaching and maintaining proper temperatures. Result: production slow-downs and waste of steam. Air film caused by inadequate venting drastically reduces heat transfer and prolongs processing time. Erratic temperature control is often the cause of rejects or product spoilage and further raises production costs.

Call In Sarco

Plant after plant has benefited from Sarco's experience in the process industries. Backed by a complete line of steam traps and temperature controls, Sarco engineers are able to offer you impartial, expert recommendations on how to *get more out of process steam.*

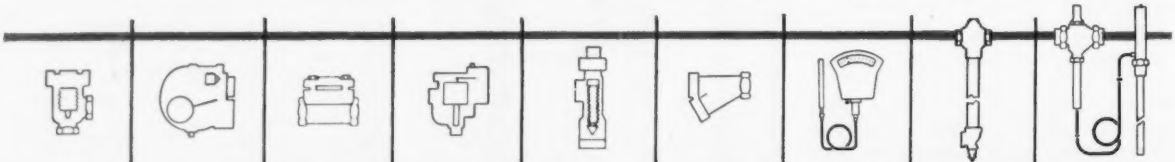
For case histories describing how other plants in your field solved similar problems, write today to Sarco Company, Inc., Empire State Bldg., New York 1, N. Y.

SARCO

improves product quality and output

2050-C

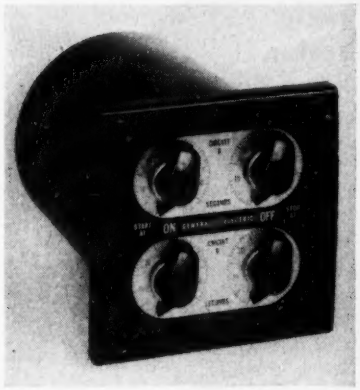
STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS



sures that range as high as 125 psi.

SB kettle is fully jacketed with extra large steam connections. Capacities range from 15 to 350 gal., pressures 90 to 125 psi.—*Hamilton Copper & Brass Works, 820 State Ave., Cincinnati.*

Circle 101C on Reader Service Card



Improved Timer Ups Process Efficiency

Accurate, adjustable time-delay opening and closing of electric contacts, is provided by new process timer.

Designated G-E Type TSA-18, timer can control such process equipment as hydraulic presses, baking equipment, mixing machines, and conveyors.

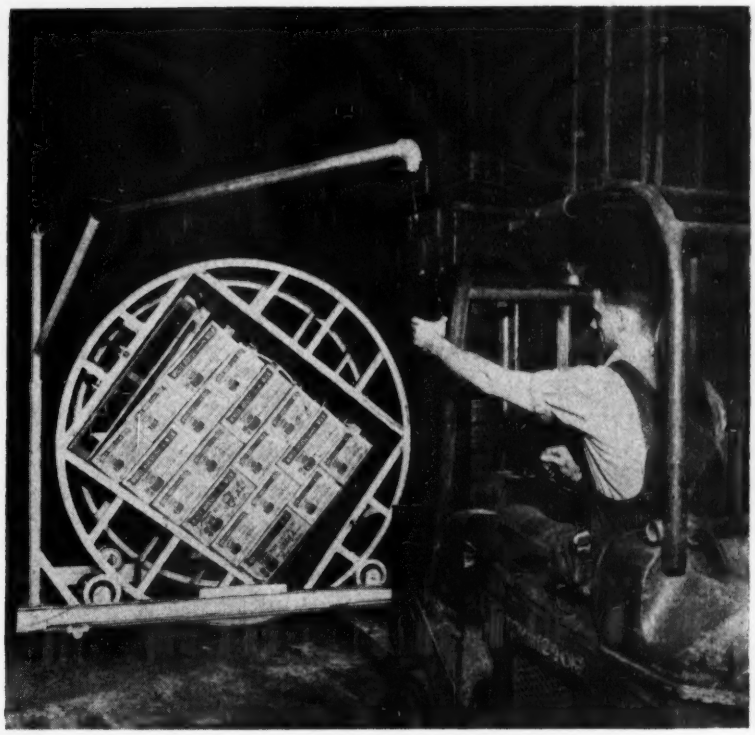
According to maker's engineers, use of new units saves workmen's time, reduces waste material, and improves products where time is a factor.

Improved features of redesigned equipment include extra heavy nylon gears, over-all construction of almost 100 percent pure zinc alloys, and a dust-resistant cover. New semi-flush mounting on face of timers reduces size and streamlines equipment. An internally engraved connection diagram together with screw type terminals permit easy wiring.

Timers are available in single-circuit or two-circuit models. Any combination of single and two-circuit units can be utilized to control 3, 4, 10 or more circuits. Equipped with a bevel for semi-flush mounting, timer requires a minimum of mounting facilities as used by all switchboard and control panel manufacturers.

Unit measures 5¾x5¾x8⅝ in. and weighs 6¾ lbs. It operates on a power supply of 60, 50 or 25 cycles, with a contact rating of 10 amp. at 120 v. or 5 amp. at 240 v.—*General Electric Co., Schenectady 5, N. Y.*

Circle 103A on Reader Service Card



Unit Automatically Inverts Pallet Loads

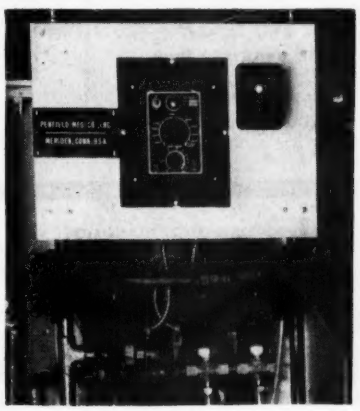
The task of inverting stocks of evaporated milk in storage is speeded and eased with use of a new device. Called the Milk Turner, unit is designed for use with lift trucks and pallets.

In operation lift truck picks up loaded pallet from storage and delivers it to turner. Driver backs truck clear, then pushes electrical control button on turner which rotates load 180 deg. and automatically stops. Operator drives truck to turner, removes inverted load and returns it to storage.

Compartment into which loaded pallet is inserted is built to accommodate the pallet as usually loaded with an additional pallet clamped into top of compartment. Size of compartment should be limited to a 48 in. x 48 in. pallet and a height of live load should not exceed 56 in. on a pallet.

Motive power for operating unit is a reversible electric motor. Normally a 1 hp. motor is employed on the turner. Motor has a gear reduction unit with power output shaft at about 25 rpm. and has a brake for both directions. Pallet loads can be inserted, turned and removed in about 1½ min. per unit.—*J. C. Busch Co., 585 Madison Ave., New York City 22.*

Circle 103B on Reader Service Card



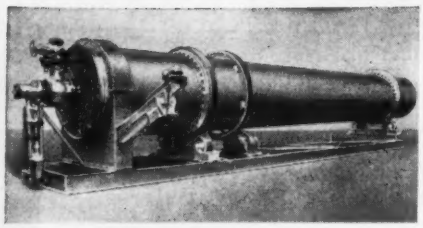
System Maintains Purity Of Water in Storage

This demineralizer, equipped with special controls, enables the automatic maintenance of storage tank water supplies at a definite known purity standard.

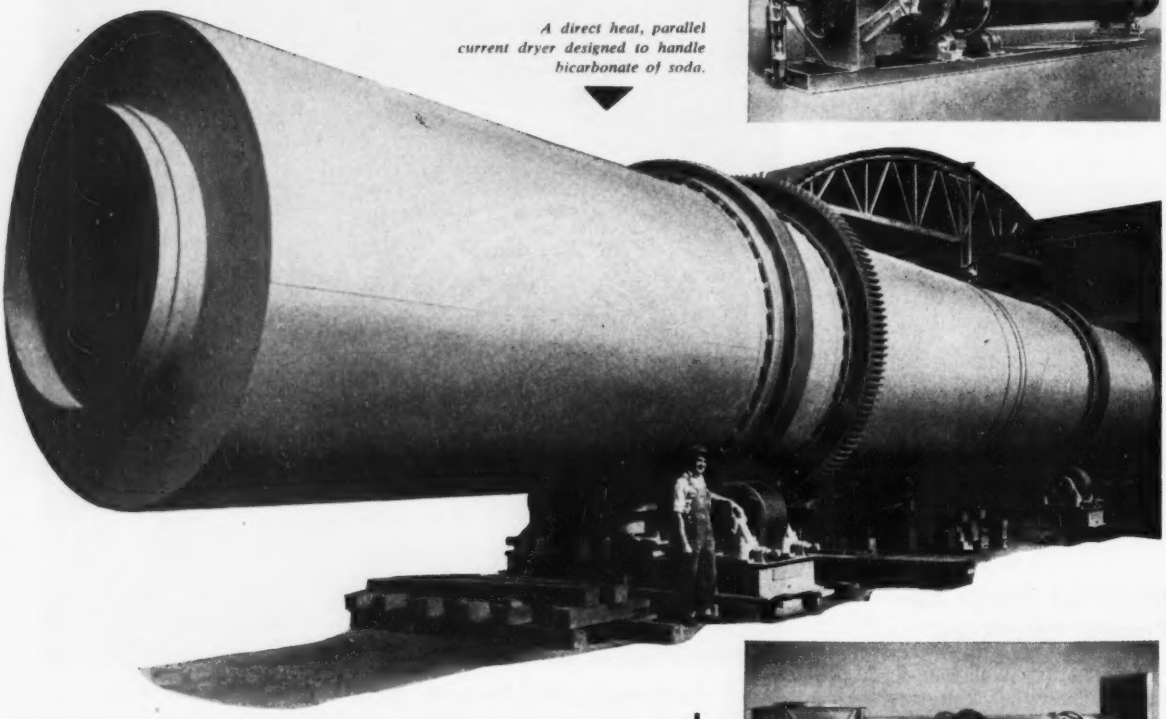
After regeneration cycle has been completed and is in its final rinse stage, operator switches on unit's automatic controls which then perform all required functions, including signaling when another regeneration cycle is needed.

Once controls take over, effluent continues to run to drain until a

Steam tube dryer. Enables continuous operation at uniform temperature, producing an extremely uniform product.



A direct heat, parallel current dryer designed to handle bicarbonate of soda.

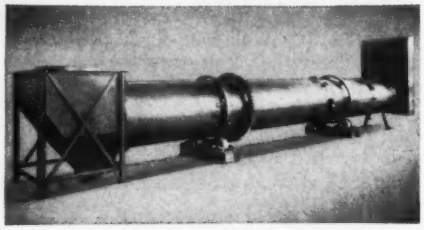


"LOW OPERATING COST" WITH

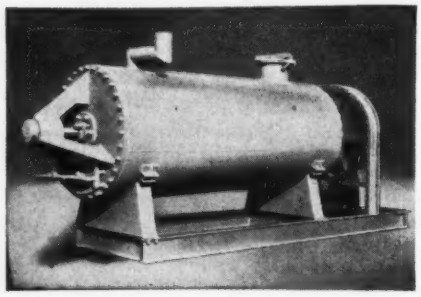
STANDARD HERSEY DRYERS

Presque Isle Starch Company of Maine reports potato starch drying production doubled... Huron Milling Company of Michigan reports one STANDARD-HERSEY dryer replaces 16 pairs of hot rolls... Stansbury Salt Company of Utah reports high efficiency at very low operating cost... Warriner Products Company of Louisiana reports *very satisfactory* operation in dehydrating sweet potatoes.

Hundreds of similar comments add up to one thing—STANDARD-HERSEY dryers are cutting costs and increasing production in many phases of the food field. We have, or can find, a solution to *your* drying problem. More than 30 different types of STANDARD-HERSEY dryers are available. Over 4,000 dryers have been built for hundreds of product applications. Investigate STANDARD-HERSEY for the answer to your drying problems.



Intermediate feed type starch dryer. Dries product from 40% to 18% with hourly output of 1,500 lbs. Extra high thermal efficiency because of no boiler loss.



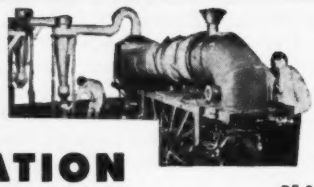
Steam jacketed batch type. May be used as either a dryer or cooker—operated under pressure or vacuum. Available with alloy or stainless interior.

SEND FOR FREE 12-PAGE ILLUSTRATED BULLETIN

Learn how STANDARD-HERSEY has aided manufacturers throughout the world in solving their dryer problems.

COMPLETE PILOT PLANT TAKES GUESSWORK OUT OF DRYING

STANDARD-HERSEY'S pilot dryers play an important part in solving your drying problems *before* blueprint stage.



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For more information, use coupon on page 177.

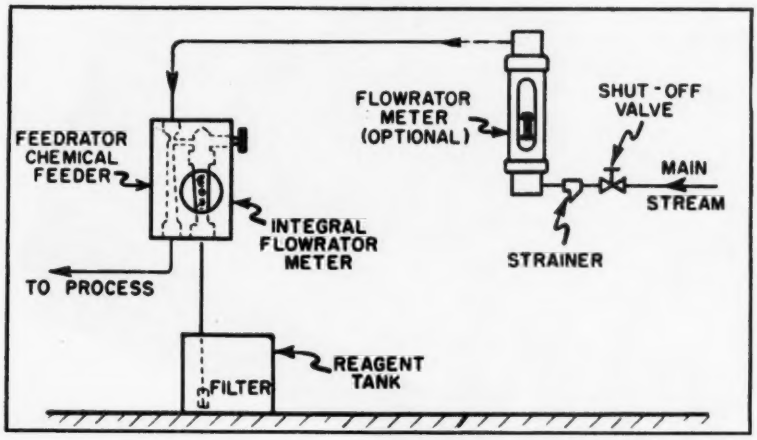
desired preset conductivity (purity) has been reached. At this time, high purity water being produced starts to flow to storage tank and continues to flow until tank is filled.

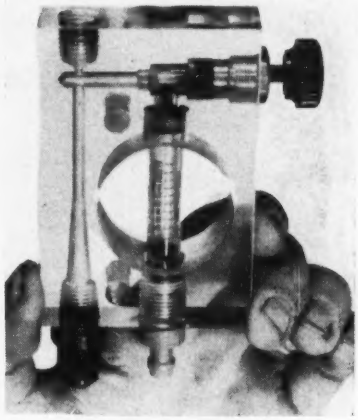
When storage tank level falls to a predetermined level, demineralizer automatically starts another delivery cycle, allowing only water of preset purity to reach storage tank and automatically turning off when tank has been refilled.

Should purity drop while storage tank is being filled, unit automatically runs to drain and in event proper conductivity does not come back within 27 min., unit will automatically stop and signal with lights.

Regeneration of unit is accomplished by customary "ion-change-in-reverse" process of "washing" cation resins with an acid solution and anion resins with a caustic solution to return resins to their original active ion exchange state. Such regeneration cycles can be accomplished in under 1 hr. whenever unit automatically signals that they are needed.—*Penfield Manufacturing Co., Inc., 19 High School Ave., Meriden, Conn.*

Circle 103C on Reader Service Card





Unit Feeds Liquids in Controlled Amounts

Small quantities of a liquid chemical can be metered, controlled, mixed and dispensed into the main liquid flow with use of this compact feeder.

Called the Feedrator, it includes a built-in ejector which eliminates need for a proportioning pump. A pressure differential in main line to create a by-pass flow through ejector is all that is necessary to operate unit.

Many corrosive chemicals can be fed directly into main stream because unit is enclosed in a Lucite block. For chemical additives which Lucite cannot handle satisfactorily, block is also available in Uscolite at some additional cost.

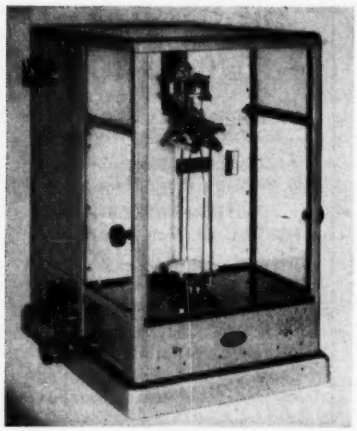
Small size of body block, 4¼ by 2¾ in., affords ease of mounting. Pipeline adaptor screws directly into block, requiring no additional fittings.

By-pass flow necessary to operate unit is relatively small. It enters at top of block, flows down through ejector creating a partial vacuum on ejector side. Vacuum induces reagent to flow through inlet at bottom of block, up through Flowrator metering tube and on into unit's mixing chamber.

Reagent flow is precisely controlled with needle valve built in. Unit comes in four standard models with reagent capacities ranging from .03-0.3 to 2-20 gph.

Should water pressure suddenly drop, a positive check against backflow of feed water into reagent tank is provided by a ball check valve between metering tube and ejector.—*Fischer & Porter Co., 19 Jacksonville Rd., Hatboro, Pa.*

Circle 105A on Reader Service Card



New Balance Speeds Laboratory Weighing

Speed, simplicity and dependability in laboratory weighing operations are claimed with use of this Emson Model S-M balance. Maker reports actual weighing times to average less than 18 sec.

This velocity is accomplished in part by instrument's rapid acting air dampening device. Other factors are location of easily manipulated, weight control knobs and vernier-type reading scale.

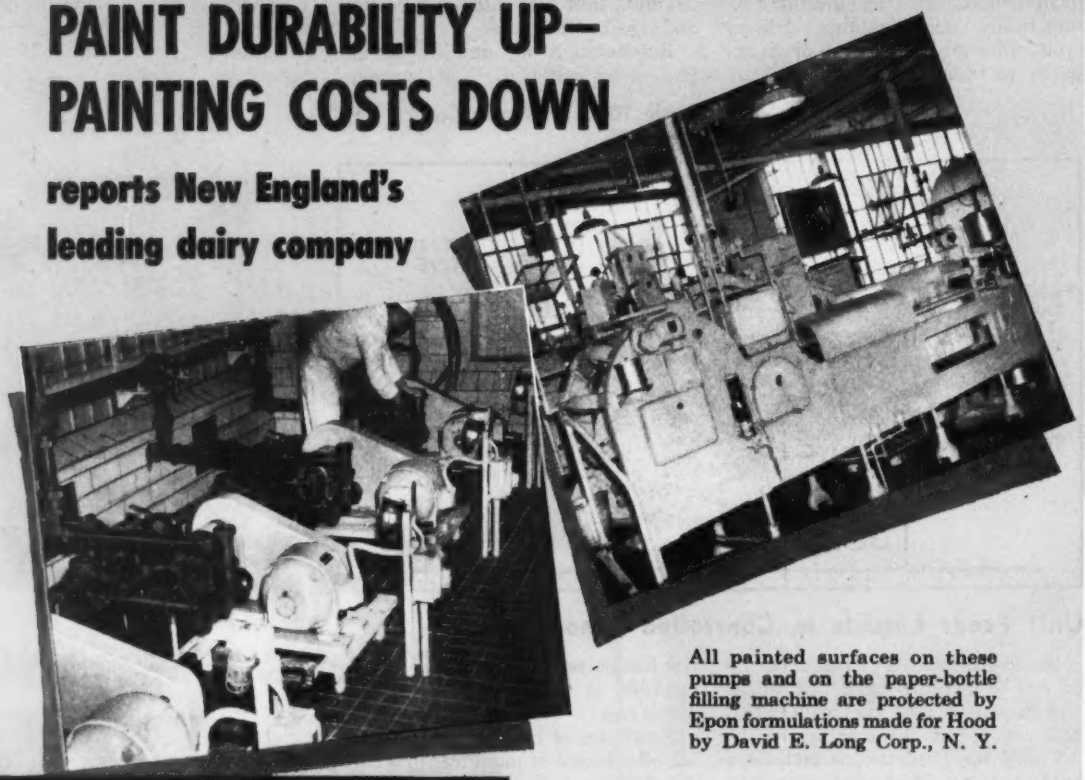
Numbered for rapid identification, control knobs are located at lower left side of instrument to permit operator to rest elbows on table while selecting weights. Reading scale is located at eye level just above weighing pan. As an added convenience to operator, instrument incorporates two beam arresting knobs—one on either side to permit arresting beam with left or right hand.

Cantilever-type beam with a 10:1 ratio, is made of a non-magnetic aluminum alloy. All bearing surfaces of balance are made of knife-edged, optically ground sapphire to minimize frictional error and provide durability. To give lowest center of gravity and reduce vibration, all weights are located in instrument's enclosed base. Unimpaired visibility is assured by all

EPON® RESIN does it!

PAINT DURABILITY UP— PAINTING COSTS DOWN

reports New England's leading dairy company



All painted surfaces on these pumps and on the paper-bottle filling machine are protected by Epon formulations made for Hood by David E. Long Corp., N. Y.

HERE'S HOW...

PAINTING is an important part of maintenance in a dairy plant—both for appearance and cleanliness. The paint must meet a wide range of conditions—steamy heat of processing rooms, near-freezing of circulation piping, scouring action of alkalies and detergents.

After conducting patch tests, H. P. Hood & Sons applied Epon resin-based paints experimentally to walls and ceilings of their laboratories, offices, bottling and processing rooms, and on piping and machinery.

The Hood results to date indicate Epon-based paints have these advantages: They can be applied directly to plaster, brick and cement with no special surface preparation. Two coats are adequate to cover any surface. Intervals between paintings are notably lengthened, which means substantial savings in labor and paint.

* * *

If you want real savings, ask your supplier for Epon resin-based paints and enamels. You'll find that these formulations have excellent adhesion; high resistance to impact and abrasion; outstanding resistance to moisture, heat and corrosives.

Call on our sales offices for names of suppliers who sell Epon resin coatings for your particular need. Write for the full Epon coatings story in the new brochure "Planning to Paint a Pyramid?"

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glass front and sides enclosing working area.

Side panels slide smoothly along felt lined channels and are designed to minimize compression when closing. While closed, interior is sealed, eliminating effects produced by body radiation, human breath or outside drafts. —*E. Machlett & Son, 220 E. 23rd St., New York City 10.*

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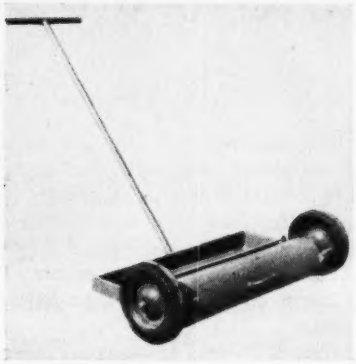


Magnetic Hand Sweeper Catches Tramp Iron

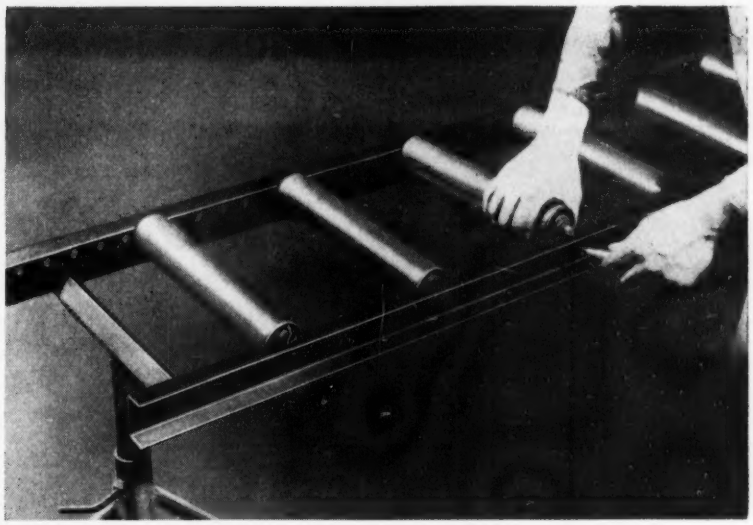
Before it causes trouble, scrap ferrous material can be readily removed from the floors of food plants, warehouses, and loading areas with use of a new, permanent magnetic hand sweeper. Product contamination, punctured tires, spark-caused fires and personnel injuries can stem from tramp iron.

Nails, screws, pieces of steel wire and tiny spark-creating bits of metal are often lodged in cracks, floor joints and around the bases of machines and fixtures, after a broom has pushed them into such locations. Magnetic sweeper lifts this material and carries it away.

Sweepers are sturdy, light, compact units that offer ease of handling. They roll easily and smoothly on ball bearing, rubber-tired wheels. Built-in retainer pans hold accumulated tramp iron until pans lift out for easy dumping.

Stainless steel covers swing clear permanent magnets to discharge their ferrous loads into retainer pans. Sweepers are produced in standard models for smooth surface operation, and in heavy duty models for use on semi-rough and unpaved areas. Both models are offered in three sizes: 2, 3, and 4 ft. effective sweeping widths.—*Cesco, Santa Rosa, Calif.*

Circle 107A on Reader Service Card



Roller Conveyor Has Pre-Punched Frames

Roller spacing on this new conveyor can be readily changed in the field to meet various requirements. Pre-punched frames do the trick.

Flexibility and economy is provided by making it possible to reposition rollers to meet changes in product or container sizes. Multiple spacing on various hole centers such as 3, 6, 9, 12 in. and 4, 8, 12, and 16 in. can be furnished when specified.—*Sage Equipment Co., 30 Essex St., Buffalo, N. Y.*

Circle 107B on Reader Service Card

Electric Hoist Provides Speedy Load Spotting

Fast and accurate load spotting is provided with use of the new Type J-3 electric, wire rope hoist. Unit is available with either two-speed or single-speed push button magnetic control. Rated capacity is 2 tons.

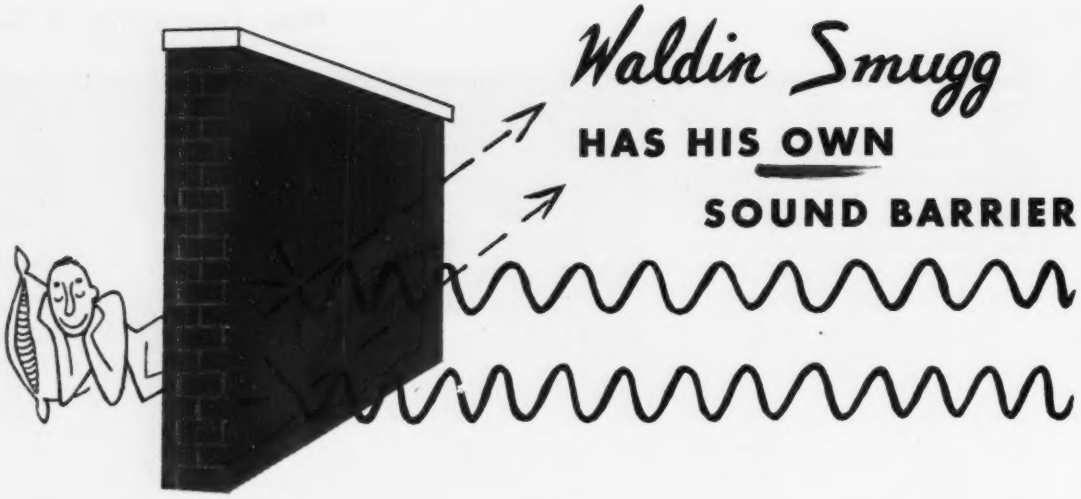
Unit is powered by a 2 hp. totally-enclosed ball bearing motor. Hoist is equipped with 2-parts of ⅜ in. cable 6x37 reeving. It has an 18 ft. lift without overwind; overwinding allows a 25 ft. lift. Upper and lower limit switches prevent overtravel of hook block in either direction. Hoist frame is a single unit casting of high strength aluminum alloy, ribbed and made with a circular cross section for rigidity.

A magnetic, disc-type motor brake automatically opens when hoist starts and closes instantly when current is shut off. This brake stops hook quickly, without drift, assuring accurate load spotting. Hoist also incoporates a Weston-type load brake with ample area to keep heating within safe limits. Operating in an oil bath, this brake features a non-reversing clutch.

Three reductions of modern-design spur gears are accurately cut from alloy steel blanks and heat treated to provide hard working surface and strong, shock resisting teeth needed for service. Shafts are made of high carbon or alloy steel, ground for accurate fits. Entire gear train is splash lubricated within an oil-tight gear case.

Cable drum is machine-grooved cast iron with shrouded flanges to prevent cable from over-riding. Hoist is available with plain, hand geared, or motor driven trolley to meet needs of any application.—*Robbins and Meyers Inc., Springfield 99, Ohio.*

Circle 107C on Reader Service Card



Waldin Smugg HAS HIS OWN SOUND BARRIER

There's a sound in the air that no one can hear. You have to *read* about it. That makes it tough for Waldin Smugg, food processor. Smugg operates behind a wall of complacency—content with the old ways, content to read only the articles about his own kind of product, foodle.

So he hasn't heard about ultrasonics ("soundless sound") and its wonderful future in food manufacture. But his competitor, Foodle Inc., has read in FOOD ENGINEERING how brewers are using ultrasonics for more efficient separation. Foodle Inc. figures ultrasonics might clarify foodle at lower cost, and improve quality at the same time. So they're trying it; it looks promising.

And they're one more jump ahead of Waldin Smugg – thanks to FOOD ENGINEERING.

Walled in by his narrow view – neglecting to look beyond his own *kind* of food plant – Smugg misses a lot. He doesn't see the tidal wave of *engineering* as it sweeps identical equipment, materials, and processes from one kind of food plant to another. *(See example.*)*

Smugg could profit from this new engineering tidal wave by reading the magazine specifically designed to bring him ideas from *all kinds* of food plants: FOOD ENGINEERING. It has more subscribers than any other food-plant magazine.

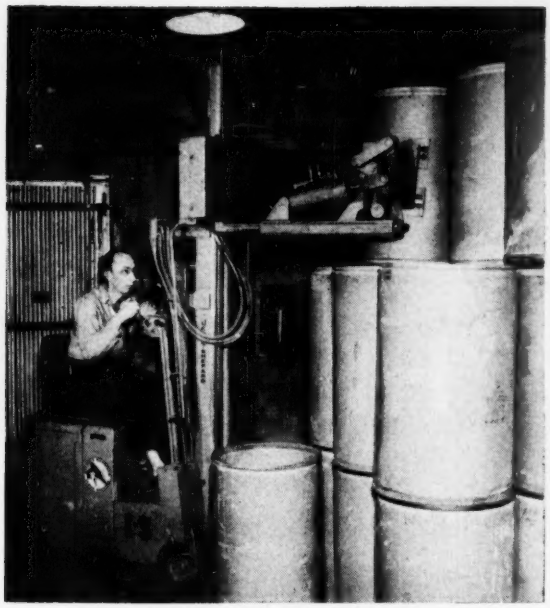
FOOD ENGINEERING is devoted to plant management and operation only. It reports on *all* food plants. And it uses the unmatched facilities of McGraw-Hill . . . to reach into *all* industries for hot developments in electronics, materials handling, labor relations, maintenance, and a host of other subjects.

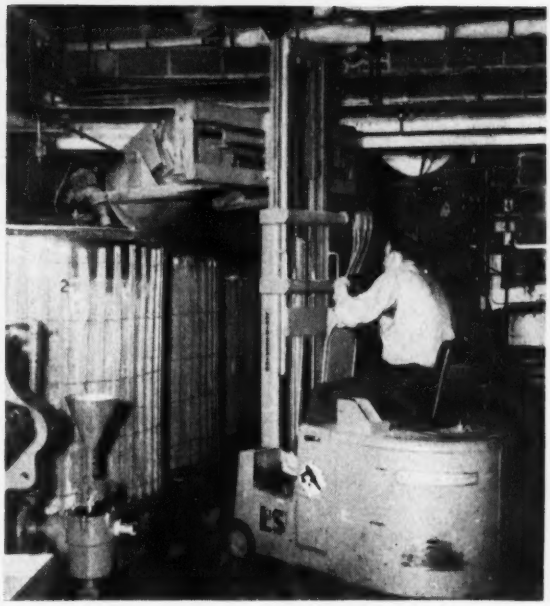
See what Smugg is missing?

We think we can *help* Waldin Smugg. If you see him, tell him. If you see him in your mirror . . .

LOOK OVER **YOUR** WALL WITH **FOOD ENGINEERING**

* Separation by ultrasonics has its future before it. This graph shows how another separating method – centrifuging – has been swept from one kind of food plant to another by the "tidal wave of engineering." FOOD ENGINEERING helps you follow, and benefit from, this "idea exchange."





Device Eases Lifting, Dumping of Drums

Drum handling is simplified with this new device, an up-ender attachment for lift trucks. Trucks equipped with unit can be employed to lift, carry, and dump contents of drums into vats, bins, mixers. Here's how it works:

Fork arms are adjustable hydraulically enabling drums to be clamped securely. Operator controls clamping action from driving position adjusting fork spread to accommodate any drum or barrel size. This part of attachment is a modification of maker's standard hydraulically adjustable clamping forks.

A hydraulically controlled pivot was added which tilts container 150 deg. forward.

All three of these motions, clamping, lifting and dumping are controlled by operator from driving position. Truck illustrated is a "Model J" 2,000 lb. capacity electric unit.—*Lewis-Shepard, Watertown, Mass.*

Circle 109A on Reader Service Card

Measures, Records Data From 24 Sources

Accurate measurement and multipoint recording for a vast range of industrial process and laboratory applications are provided by new instrument models, the Tektolog and the Null Balance recorder.

Instruments are capable of gathering operating data from 24 separate sources and logging the collective information on a single circular chart. They can be directly coupled to tachometers, resistance thermometers, conductivity cells, strain gages, pH meters, to produce a permanent record of operating speed, temperature, pH.

Recording in either instrument is achieved through a six-point turret pen mechanism which traces six different colors. By dividing standard circular chart into four equal parts and installing a mechanism to rotate chart periodically, data from six separate points can be logged in each quarter. A standard synchronous drive motor keeps chart "in time" so that each quarter of chart may be made to correspond to a 1 hr., 8 hr., 24 hr., or 7 day period. Print cycle is 5 sec. per point and total cycle for all 24 points is 2 min. A convenient feature allows cycling mechanism to be switched off, permitting unit to operate as a standard single-point pen inking recorder.

Tektolog is accurate to plus or minus 1 percent of full scale and features a sensitivity of 0.1 percent with a reproducibility of plus or minus 0.5 percent. Inputs range upwards from 50 micro-amp. d.c. and 30 milli-volt d.c.

Null Balance instrument is particularly suited to resistance bulb thermometry, conductivity measurements, displacement with strain gages or linear differential transformers. In field of thermometry, a selection of nickel bulbs and fittings are available for use with temperatures up to 600 deg. F. and a selection of high temperature bulbs and fittings to 900 deg. F.

Basic accuracy and linearity of recorder on all standard temperature ranges is better than plus or minus 0.5 percent. Other features include quick range and measurement change by replacement of a separate unit, bridge-element box having provisions for a maximum of four separate inputs.—*Fielden Instrument Div., Robertshaw-Fulton Controls Co., 2920 N. 4th St., Philadelphia.*

Circle 109B on Reader Service Card

Dea... ...plant?...

HESSER

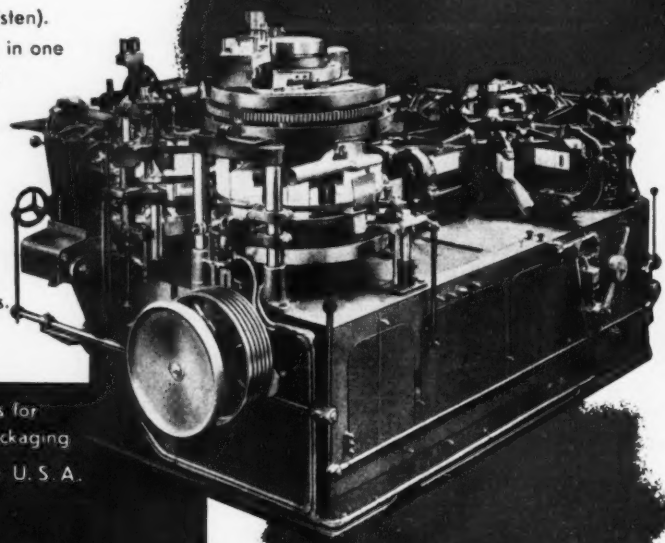
Packaging Machinery is almost silent!

Because of:

- Main gears running in permanent oil bath
- Helical tooth gears
- Jerking movements - instead of back-and-forth slashing movements
- Smooth running ball bearings on main transmissions
- Special alloys for greater strength that reduce weight

Here's a revolutionary conception of packaging machinery-**HESSER** machines are next-to-noiseless and almost completely free of vibration! You'll have to see it to believe it . . . we urge you to come and see (and listen). Think of it - plants with ten and more big machines in one room find that ordinary conversation can be carried on without interference. Employee morale goes way UP . . . work is done better, faster.

And these same construction features contribute to the long, long life of **HESSER** machines. Glance at the list of these features . . . you'll begin to understand why. But no words can take the place of seeing these remarkable machines. So write today and arrange for a demonstration.



HESSER makes a complete line of machines for weighing, wrapping, bundling, printing and packaging

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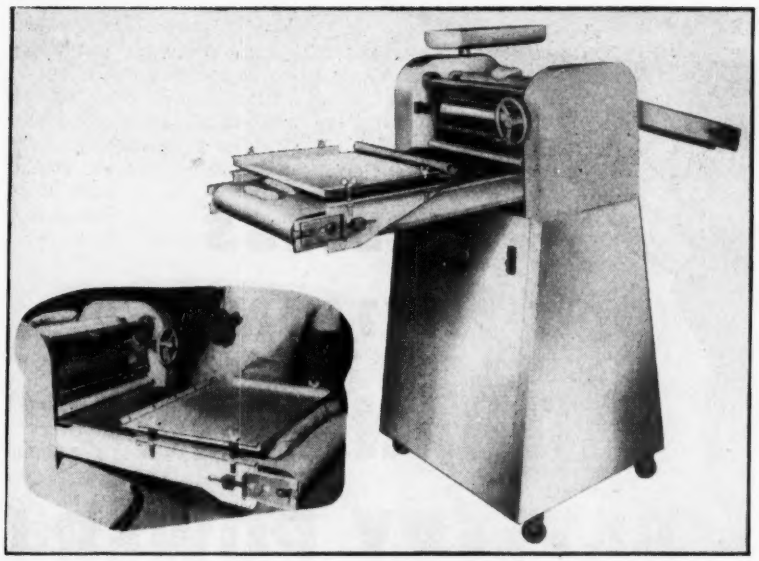


New Moulder-Sheeter Saves Time, Labor

Savings in time and labor in the handling of all types of sweet goods, dough for coffee cakes, sweet rolls, roll-in Danish, puff paste, pie and pizza pie doughs is reported with use for this new moulder-sheeter. Product quality is upped too.

Maker states unit is 5 to 6 times faster than hand rolling. It rolls out the dough smoother to uniform thickness. With less handling, doughs are kept tender and full of life. Rollers adjust from 0 to 1 in. opening and are precision ground in alignment with scrapers for efficient operation. All gears and operating mechanisms are fully enclosed to keep out dirt and flour dust.

Pressure plate with canvas belt and chain drag attach quickly to sheet and mould white, whole wheat, rye, cinnaman, Vienna, French and Pullman breads. Also sheets and mould cresents, salt sticks, hot dog and other varieties.—*Anetsberger Brothers Inc., Northbrook, Ill.*

Circle 111A on Reader Service Card

Roller Conveyors Equipped With Nylon Bearings

For service in plants where brine, alkali and acid conditions are severe, these new conveyors are equipped with Nylon bearings turning on stainless steel axles.

To test resistance, unit shown above after boiling in 75 percent Oakite solution remained in operating condition and showed no measurable effects.

A similar test was run in a 65 percent salt brine solution with no noticeable change in bearing or stainless steel axle. In both tests, the zinc-grip coating of steel roller formed a protective oxide coating that was unaffected except for discoloration.

Conveyors are available in standard 11½, 15, 18, and 24 in. widths, with lengths as desired, equipped with zinc-grip coated rollers in gravity and live roller types. Standard live roller models are powered with gearhead motors to suit requirements.—*Metzgar Conveyor Co., 493 Douglas St., N.W., Grand Rapids, Mich.*

Circle 111B on Reader Service Card

Displacement Pump Is Air-Operated

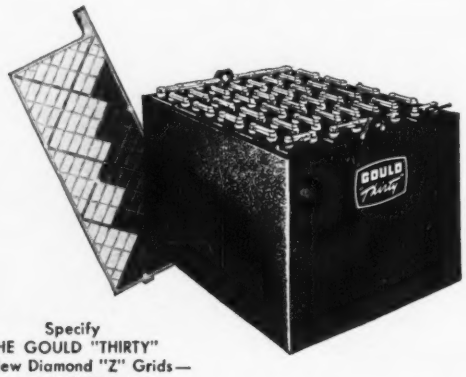
Hot soup, glucose, fruit pulps, sugar syrups, edible oils are among the many food products which can be moved with use of this compressed air-operated displacement pump. Pneumatic unit has no rotating or reciprocating parts.

Called the Ejectopump, it operates automatically when connected to any compressed air supply line and pumps the liquids to be handled in a series of regular suction and discharge strokes. Pump has no bearings, glands or revolving shafts and has a wide variety of industrial applications. Pump consists of a cylindrical casing, a float and two return valves, which are in contact with the liquid, and a header mounted above the casing which is never in contact with the pumped liquid. The header houses the pneumatic valves and an air-operated ejector which is in operation during the suction stroke only. Rate of air admission to casing during delivery stroke is adjustable, and output can be controlled

TIRELESS ACTION

THANKS TO BATTERY POWER!

Tireless action—that's what your industrial trucks have got to have to keep up with today's materials handling needs. That's what you get when they're powered with new Gould "Thirty" Batteries with Diamond "Z" Grids. Extra reserve, extra performance, extra stamina are built into these batteries to keep your trucks in action all day long. There's no power like battery power—no battery power like *Gould* power.



Specify
THE GOULD "THIRTY"
with New Diamond "Z" Grids—
America's Finest
Industrial Truck Battery

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Always Use Gould-National Automobile and Truck Batteries

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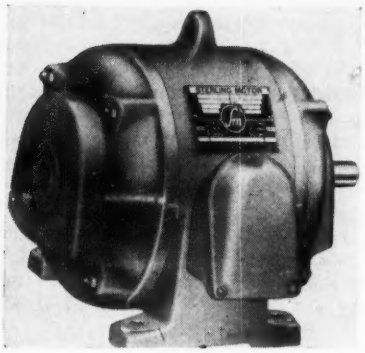
to supply any desired pumping rate.

Pump requires no lubrication. Casing is never completely emptied during normal working and no air passes into delivery pipe. It is, therefore, impossible for aeration to take place, and as there is no churning action, pump is particularly suitable for food products. Since there is no vibration, special foundations are not required, and pump can be placed on any level surface.

When supplied with compressed air at 30 to 50 psi., pump will deal with discharge heads up to 50 ft. Normal maximum suction is 10 ft. but by fitting a special ejector 20 ft. can be handled.

Pump has a mild steel casing with gunmetal or cast iron non-return valves, gunmetal float and float rod and cast iron header with gunmetal fittings. Pumps can be supplied in Monel, Inconel or stainless steel for foods.—*Ferro Corp., 4150 E. 56th St., Cleveland, Ohio.*

Circle 111C on Reader Service Card



Many Advantages Cited For New A.C. Motors

Five new features—more hp. in less space, new terminal boxes, greater bearing protection, protected construction, and improved insulation—are reported for new electric motors in frame sizes 182 to 184.

Compact drives incorporate new NEMA standards which specify more hp. from volume of space occupied. More than 50 percent of the inactive space in previous designs has been eliminated, creating a smaller, more compact unit.

Diagonal cover type boxes may be rotated 360 deg. to be fixed in any desired position and have tapped hole for conduit. A moisture resistant labyrinth seal on the pulley end protects open mouth motors as well as fan-cooled designs. A plug seals the short end bearings.

New brackets give greater protection to the windings. Improved insulation provides greater electrical and mechanical strength to stator windings. Windings are protected with a heat-resistant baked varnish and moisture-resistant sealer. Motors in frame sizes 182 and 184 are now in production and larger frames will be introduced at subsequent intervals.—*Sterling Electric Motors, Inc., 5401 Telegraph Road, Los Angeles, 22.*

Circle 113A on Reader Service Card

Safety Glasses Adjustable To Individual's Face

New shatterproof, multi-purpose safety spectacles, called "Visor-Tuc" eye savers, protect the eyes from injuries and weigh hardly more than an ounce.

Over-eyes protection from glare and flying particles is provided by the built-in visor, an extension of frame, shaped to fit snugly against wearer's forehead. Injury from side or bottom is prevented by "semi-cup" lenses, so called because lens-flanges extend toward cheek.

Spectacles are made in a single frame style that fits all workers. This feature is made possible by a nosepiece which rests lightly on nose and by "Retrax Temples" which can be adjusted by each wearer to suit shape of his face.

Shatterproof, methacrylate lenses can be replaced quickly. They can be easily removed and inserted by wearer, yet lock securely in place. Lenses are optically correct to prevent eye strain and permanent injury resulting from distortion of image. They are available in clear and light, medium and dark shades of green.—*Watchemoket Optical Co., Inc., 232 W. Exchange St., Providence, R. I.*

Circle 113B on Reader Service Card

Improved Soldering Guns Speed Maintenance Work

Increased power of restyled and improved soldering guns, makes quick work of numerous shop, maintenance, or laboratory soldering jobs. New versatile tools combine adequate heating capacity with finger-tip control.

Guns' 5 sec. heating speeds maintenance and repair. Tip fastening arrangement assures full, constant heat by eliminating contact resistance and oxidation. Dual heat feature of D-550 affords extra capacity where high heat is required, and provides a substantial increase in tip life.

Pistol-grip has now been centered under housing for better balance, making work easier and faster. All models are equipped with dual spotlights for accurate soldering even in dark corners.

Two new industrial models are available. Single heat 250w; dual-heat 200-275w, model.—*Weller Electric Corp., 808 Packer St., Easton, Pa.*

Circle 113C on Reader Service Card

New Dewatering Reel Is Self-Cleaning

A new dewatering reel incorporates a modified rod design to eliminate the carryover of conveying water.

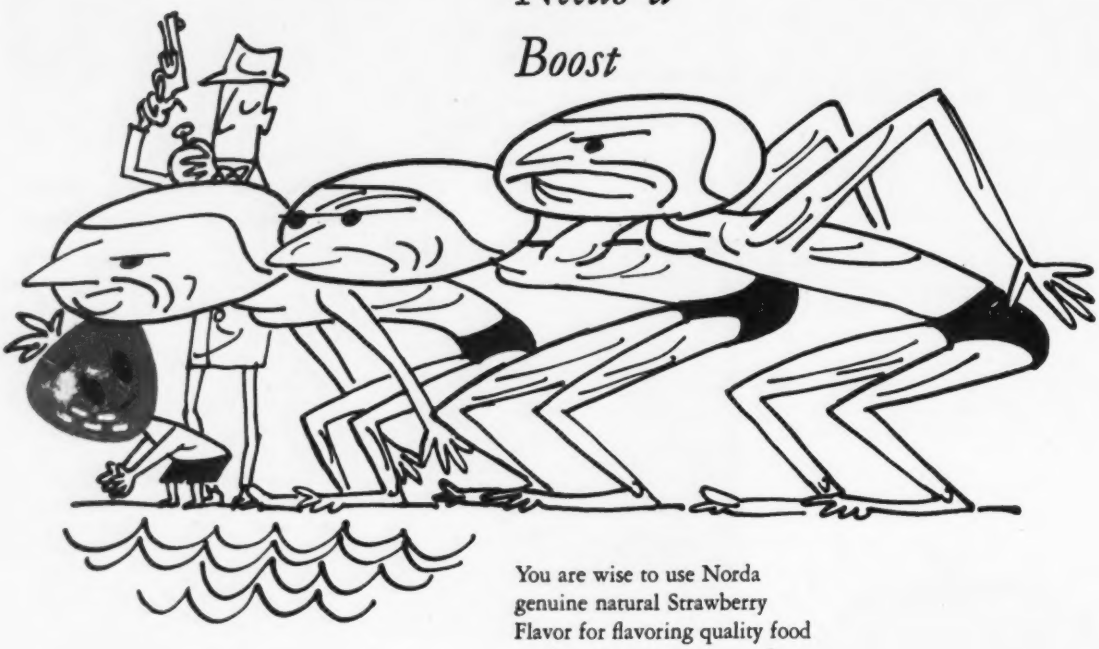
Unit, used in flowing or water conveying systems, is designed to be self-cleaning so that refuse does not collect between rods. Keeping rods clear also adds to primary or basic effectiveness of unit, that of cleaning the product. —*Berlin Chapman Co., Berlin, Wisc.*

Circle 113D on Reader Service Card

It's free—and easy to get. Simply note here the items on which you want more details, then circle each key number (there's one given at the bottom of each items) on the handy Reader Service postcard—page 177. Then sign at the bottom and mail.

For your convenience, too, items in this department are listed and keyed in the Reader Service Section.

When a Strawberry Needs a Boost



You are wise to use Norda genuine natural Strawberry Flavor for flavoring quality food products. They will always be uniformly fine, and they'll always be popular.

If it might increase your costs, and cut into your profits, to use only such a natural fruit flavor, consider supplementing it with Norda imitation Strawberry.

Norda imitation Strawberry Flavor is the perfect team-mate for the genuine article. Its characteristics are amazingly similar. It has the real fruit taste, its full-body, its concentrated strength and richness.

Try this profit-making combination. Test both of these outstanding Norda Strawberry Flavors by sending today for free samples.

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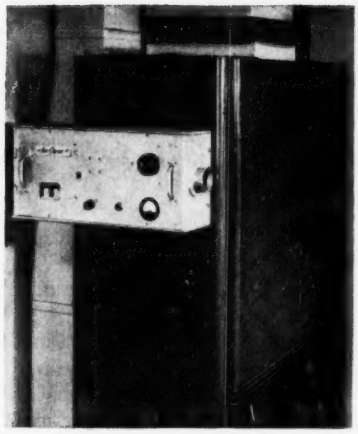


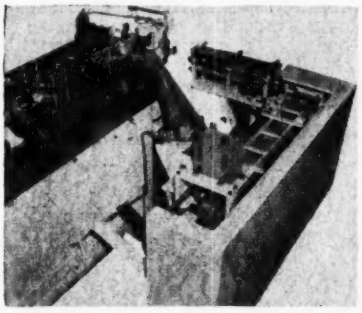
Odor-Free Air Provided By Ozone Generator

Forced-air heating or cooling systems can now be supplemented with a new type, simple to install, ozone generator to provide odor-free air.

Called the Type CV "Air Clear", generator is compact, self-contained and can be mounted on sidewall of a heating-cooling unit or on suction-side of an air duct where ozone can be introduced directly into airstream. Only a small amount of ozone is needed to correct objectionable air conditions.

Unit has no moving parts, requires little maintenance other than periodic cleaning, and only cost of operation is low-wattage electric current.—*General Ozone Corp., 855 W. Washington Blvd., Chicago 80.*

Circle 115A on Reader Service Card



Attachment Ups Versatility Of Packaging Machine

With addition of a new attachment on this packaing machine the assembly will open a flat carton, place one or more bag type packages (being produced on the machine) in the carton, and make the closure.

Unit is now in operation cartoning powdered milk, soups, gelatin, and other products contained in pouch style packages. With new attachment equipment will: (1) Form a pouch style bag from a roll of film, foil, paper, or other heat sealing material. (2) Fill the package quickly and accurately. (3) Seal the bag. (4) Place one or more bags in a carton. A high rate of production with one operator is claimed for the equipment. Solid, liquid, and powdered materials can be handled.—*Bartlett Engineering Co., Rockford, Ill.*

Circle 115B on Reader Service Card

New Chemicals

Protects Skin Against Industrial Irritants

Two types of ointments have been developed for protecting the skin against extreme exposure to industrial irritants. One, Clerex, protects against organic solvents and solvent-borne irritants. The other type, Hydrepel-A and Hydrepel-S protects against water solutions and water-borne irritants.

Former is a protective gel containing a modified carbohydrate gum base which on drying forms a continuous strong elastic film adhering to the skin. It does not interfere with tactile sensation. Film is insoluble in all anhydrous solvents. It is used to protect skin against paints, varnishes, adhesives, plastics, lacquers. It is packaged in 3 oz. tubes.

The latter are creams which protect against water solutions and water-borne irritants by forming adherent water-insoluble coatings on the skin which are invisible, do not interfere with tactile sensation and withstand normal washing of skin with soap and water. They spread easily, dry quickly, repel water and water solutions and adhere well to skin. They may be kept on skin for long periods, or, when indicated, may be easily removed with an alcohol solution.

Hydrepels are plasticized combinations of ethyl cellulose and castor oil in mixed propanols with a water-repellent vanishing cream base. Hydrepel-S contains a substantial proportion of silicone (dimethyl polysiloxane). The remover consists solely of mixed propanols.

Both A and S are packaged in 1 and 2.5 oz. tubes. Remover is packaged in 1 qt. and 1 gal. containers.—*Hygiene Research Inc., 684 Broadway, New York City.*

Circle 115C on Reader Service Card

Salt Tablets Prevent Struvite Formation

Of interest to canners is a recently perfected anti-struvite salt tablet.

Struvites are more or less harmless crystals that are present in varying amounts in today's canned fish. They are tasteless, colorless, quite insoluble in water, but are dissolved by stomach acids.

Crystals are stated to have several bad features—they look like glass, could injure the mouth, and are gritty.

Technically known as magnesium ammonium phosphate hexahydrate, they are formed in canned fiish from three chemical radicals which occur naturally in fish and shell-fish. This formation takes place only after the seafood has been processed and may appear within a few weeks or months.

Patented salt, which prevents formation of struvites was developed through the efforts of the Gorton-Pew Fisheries Company, Ltd. It is now being made in correctly proportioned tablets of sodium hexametaphosphate and sodium chloride.

Tablets may be deposited in food can by machine or hand.—*Scientific Salting Co, 1530 Hadley St., St. Louis 6.*

Circle 115D on Reader Service Card

OTHER DEPARTMENTS

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In Behalf of Progress . . .

Your Competitors Are Investing in The Future

You should be warned that recession talk has put no fear into the hearts of pace setters in the food business. To the contrary, your competitors are spending even more for plant modernization and expansion this year than last—$865 million against $818.

What's more, the industry anticipates a 7% increase in sales in the 1953-54 period and a 15% rise for 1953-57.

It is highly significant, too, that manufacturing industries in general are spending for a bright future. Even though they expect their sales to be off by a small 2%, they are increasing capacity 4%. The manufacturing industries will pay $12.3 billion for new plant and equipment in '54, or a few million dollars more than last year.

Revealed by a survey made by the McGraw-Hill Department of Economics, these trends clearly show that business men not only have faith in the future of business, but faith in themselves.

They are looking beyond the current general sales letdown to new growth in the future. And well they may. To those who consider the basic economic factors, the conclusion is clear that the wants and unfilled needs facing this country are tremendous.

There is a conservative $500 billion backlog in essentials such as schools, highways, homes, and factories. And on top of that, our population growth equals the addition of a new city the size of Toledo or Birmingham every month.

Another highly significant point shows up in the survey. It is the increasing degree of competition that manufacturers face in the future. While industry expects sales to pick up by an average of 4% between 1953 and 1957, individual companies believe that their own sales will grow three times that much.

Each of the pace setters is out to get a bigger share of the market. And they are gearing their operations to that end.

It seems that only frustrated politicians and rabble rousers take a dim view of the business future. Leading manufacturers certainly are confident. And they are backing their confidence with billions of hard-earned dollars.

While food manufacturing is a stable business, the general business level does effect it. Recent history well demonstrates that the higher their income, the more people spend for food.

In addition to reflecting strong confidence in the future, the survey spotlighted a strong trend to modernize for efficiency. Of the capital expenditures by food manufacturers, 59% went for modernization last year, against 41 for expansion. This year, 63% will go for modernization, and for 1955-57 period, the figure rises to 70%.

This puts into the form of figures the intent written into the annual financial reports of leading food manufacturers. Practically every one we have read this year proudly points up plant improvements and their future significance to the earnings of the company.

These reports also mention expansion in capacity, this spearhead necessarily being pointed at the business of other food firms, as well as at the natural growth in food consumption. Here it is pertinent to note that the index of food manufacturing capacity has increased from 117 in 1946 to 172 this year, and it is forecast at 184 for 1957.

Another point brought out by the survey is that all food manufacturers usually spend their entire depreciation allowance on new plants and equipment. And 50% of them would spend more in this way if the depreciation allowance were increased.

This point can be sharpened on the comment made by F. W. Specht, president of Armour and Company, in announcing his $10 million Chicago modernization plan. We quote:

"I don't think we should be bottled up by any restrictions such as spending money only to the extent of depreciation, because it is only by having operations which are efficient in every detail that we can bring into this business the profits we need to do justice to our stockholders."

Inquiry into research expenditures also was made in the McGraw-Hill survey. It seems significant that the two industries spending the most for research—chemicals and electrical machinery—are the ones that expect the greatest sales growth by 1957.

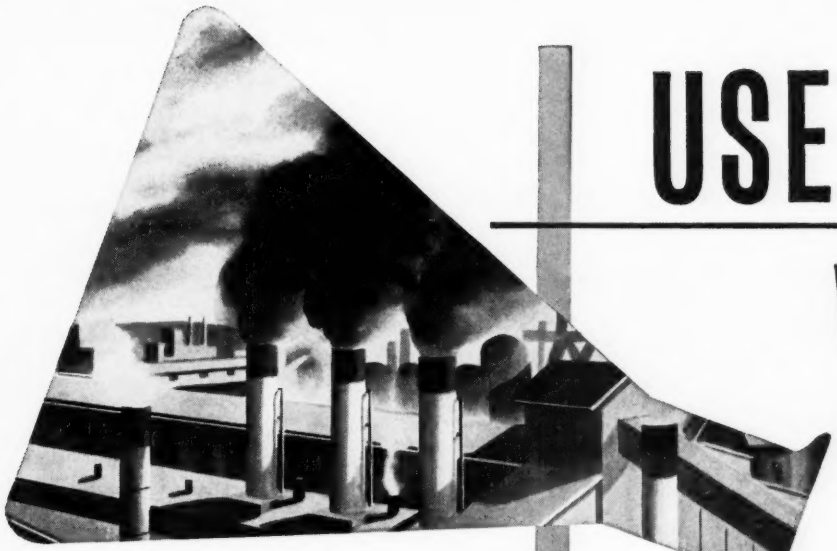
In the food field, research figures were obtained only for meat packers. It is 0.1% of sales for 1954, compared to 3% in the chemical field. Other data on research expenditures by the food industry indicate that they are much too small for the good of the industry.

But when it comes to modernizing for efficiency, it is not a question of what *should* be done. It *must* be done to meet competition.

George H. Coppers, president of National Biscuit Co., recently sized up competition as follows:

"We have a lot of competitors in our business and quite a few of them are highly successful. Many of their products are very popular and they sell."

You can say the same for your business.

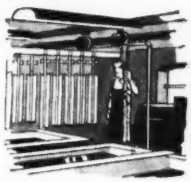


USE WASTE HEAT!

AIR CONDITIONING

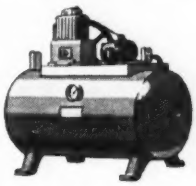
Let the adaptable Servel 25-ton Water Chiller convert waste heat, or steam from any source, into lowest cost air conditioning for your plant and offices!

PROCESS COOLING

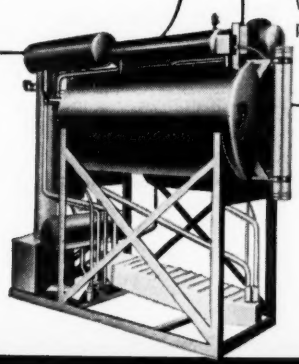


Use the cheapest energy source—even waste heat—to achieve high-efficiency cooling for manufacturing processes! Servel Water Chiller operates on dependable absorption principle.

INDUSTRIAL PRECOOLING



Increase capacity and improve performance of air compressors and internal combustion machines! The Water Chiller is compact, light; can be safely installed on almost any floor.



The Servel Water Chiller cooling system has no moving parts to wear. It is quiet and vibration-free. Light floor loading and freedom from vibration mean that no special foundations or braces are needed. Zone control is unusually easy. And operation (using waste heat, or steam from the cheapest source) is low in cost. Backed by a 5-year warranty. See your dealer or mail coupon for information and engineering co-operation.

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TURN PAGE FOR FOLDOUT FLOWSHEET →

1 RECEIVING is at one side of plant. Here, cans of dairy products are removed from trucks and placed on conveyors. Milk goes to receiving room, cream and condensed to 35-deg. storage. Following washing, empty cans return to platform. Supplies are palletized and trucked to storage areas. Note evaporative condensers on roof.

Multi-Product Dairy Plant

Features Latest Processing Equipment, Methods, Engineering

THE MANY ADVANTAGES of modern functional design and one-floor operation—as applied to a medium size ice cream and milk processing plant—are heralded in the new Southern Dairies, Charlotte, N. C., facility*.

The cream and milk operations are carried out in one central (7,000 sq. ft.) first floor area. This provides for expansion of either one without extensive alterations.

Receiving and dairy-product storage areas are situated on one side of the processing room—Point 1 in accompanying diagram. Cold storage facilities for finished products, also the shipping platform are on the other. In this way, products move through processing to storage and delivery in continuous streams without interference.

Flanking the ends of the processing area are two huge warehouses in which supplies are stored.

Maximum sanitation and appearance with minimum maintenance were attained in processing and dairy products receiving areas by use of ceiling-height buff-colored, ceramic structural tile for walls and red quarry tile for floors.

An outstanding feature of the floor construction was preparation of a base with special Furnane carefully graded toward floor drains, with the tiles then set in Furnane. Result is a long-lasting, well drained, attractive floor.

Refrigeration equipment, boilers, electrical controls, and other utilities are located in the basement, with supply lines hung from the ceiling. This eliminates all piping (other than the stainless product lines) from the processing areas.

Pipe lines or conduits feed through the floor at the unit being supplied. At these locations, metal thimbles are set in the processing area floor to prevent water from leaking through into the basement or along the pipelines.

Where circulating hot water is needed, as for the plate pasteurizers, water heaters—Point 3—are suspended from the basement ceiling and supplied with low pressure steam from the two 125-hp., automatic, oil-fired boilers. These heaters operate with a minimum of piping, and give instant response to demands of the pasteurizers.

Refrigeration is supplied by four York vertical compressors (231 tons) and three Creamery Package 6-cylinder, 6¾x5, V-type units (150 tons). Latter are used as boosters to maintain low temperature of the ice cream hardening room. Three Niagara evaporative condensers, mounted on the plant's roof, complete the refrigeration setup.

Hardening room is cooled with four 28,000-cfm. King refrigeration units. These supply air to 48 Anemostat (2,300 cfm.) diffusers through ceiling mounted ducts. Milk and dairy product coolers are refrigerated with Niagara circulating units. Product cooling in plate units and by-product tanks is by sweet water from ice builder.

An additional feature of the hardening room is construction of the floor on 8x16 in. concrete blocks placed on their sides to form ducts through which air is drawn.

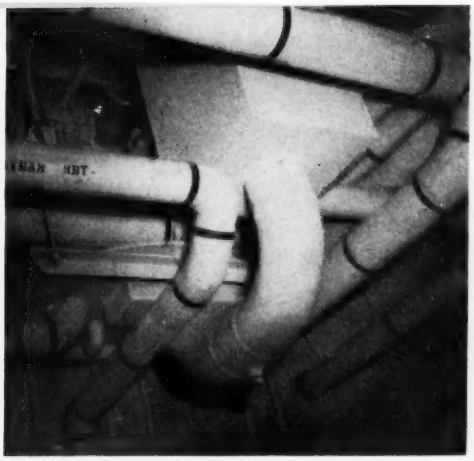
HTST pasteurization is used for both milk and ice cream mix. In the latter case, dairy products and dry ingredients, such as sugar, chocolate, and stabilizer, are assembled in one of the two 500-gal. stainless, agitator-equipped mixing tanks. Then the mix is pumped through one section of the plate type heat exchanger and back to the tank until a temperature of 160 deg. F. is reached.

Mix is then homogenized and forced through the pasteurization section of the plate unit, where it is heated to 180 deg., held for 25 sec. in the stainless holding tube, and discharged to the cabinet cooler—Point 4. Cooling is by tower water and direction expansion ammonia.

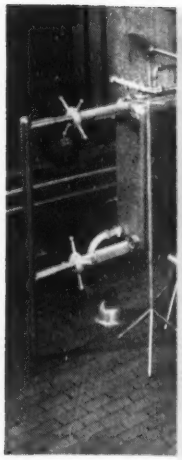
Dry supplies are palletized on arrival and moved to storage areas by fork trucks. Ice cream is conveyed from freezing area into the 7,300 sq. ft. hardening room, where it is placed on pallets. For loading onto delivery trucks, pallets are trucked to shipping platform.

* For complete story on this SD operation, see "Single-Product Benefits In Multi-Product Plant," FE, 52-55, March, 1954.

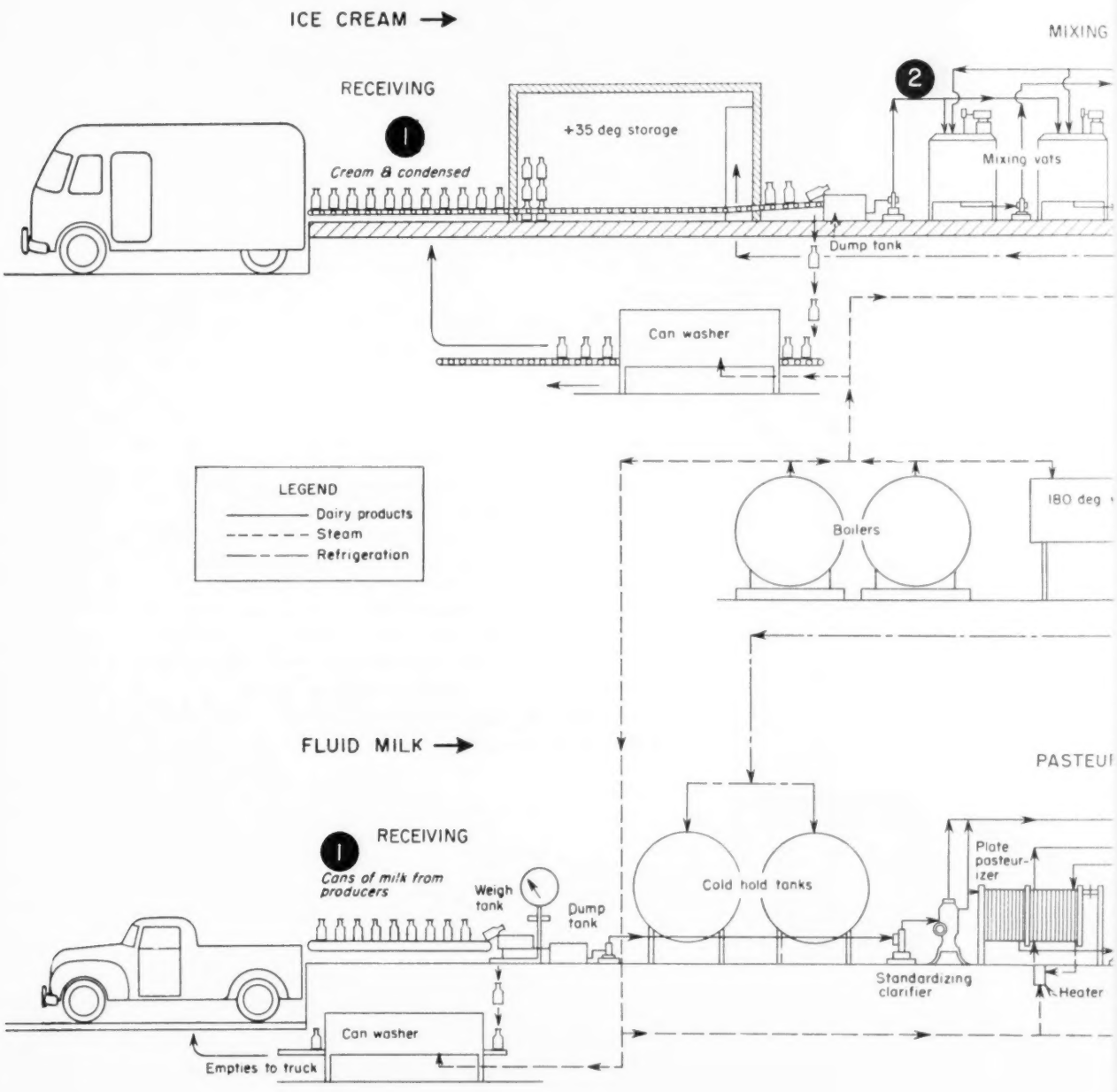
2 **ICE CREAM MIXES** are prepared in these 500-gal. unjacketed vats. Heating is by circulation through section of plate pasteurizer.



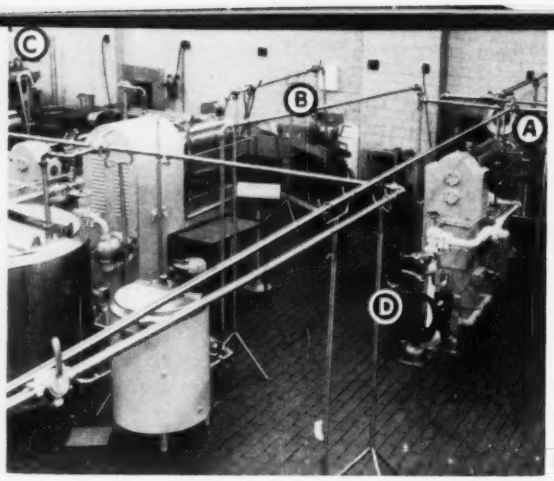
3 **WATER** heaters for pasteurizers are suspended from basement ceiling as are all other pipe lines and electrical conduits.



4 **PLATE UNIT** in 2 stages. He tube, cooled on cab

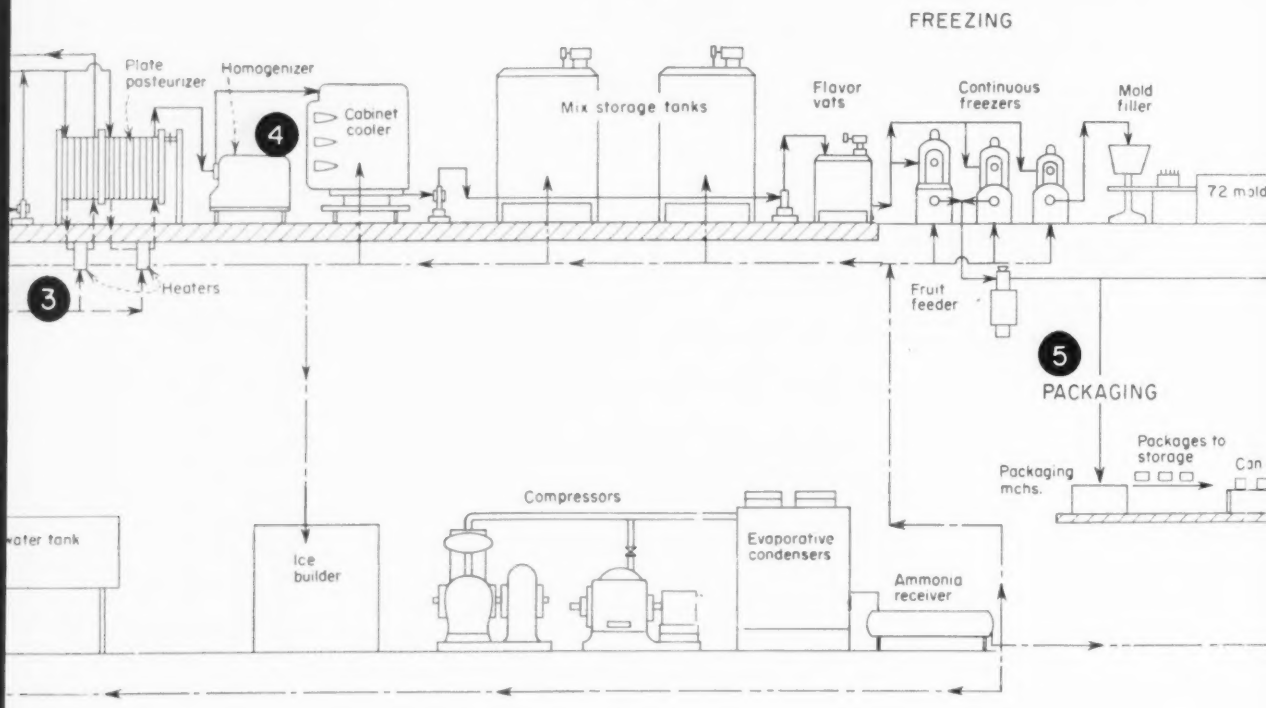


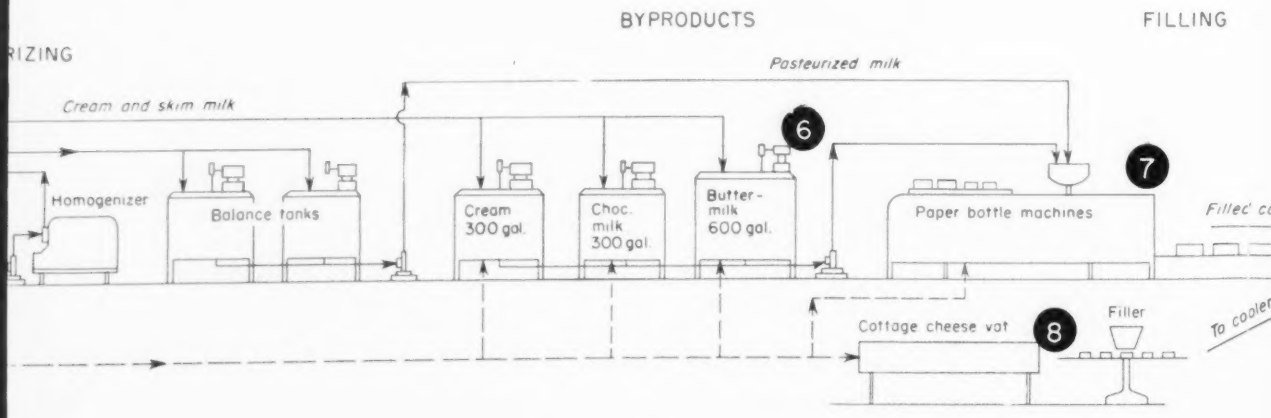
(center) heats ice cream mix
t mix is held 25-sec. in 2-in.
net cooler (left).

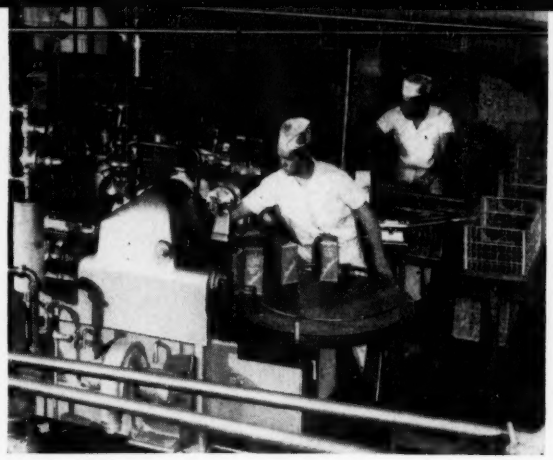


5 **FREEZERS** (foreground) supply ice cream to can filler (A), pint machine (B), cup filler (C), stick novelty unit (not shown). Note handy washup station (D).

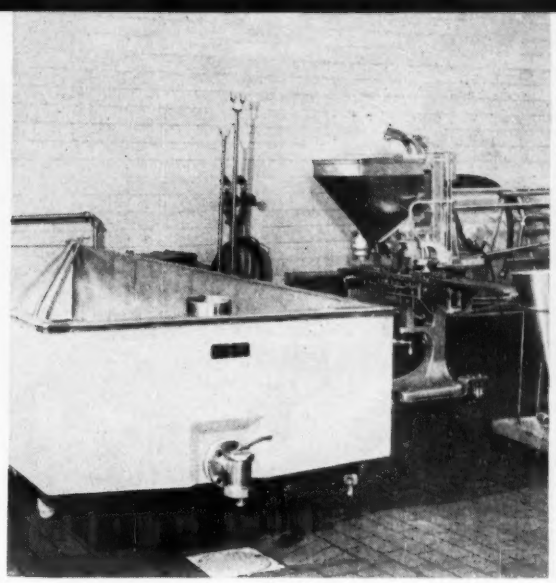
6 **HEATING** and cooling of byprodu
vats (rear) are controlled fr
panel on wall.





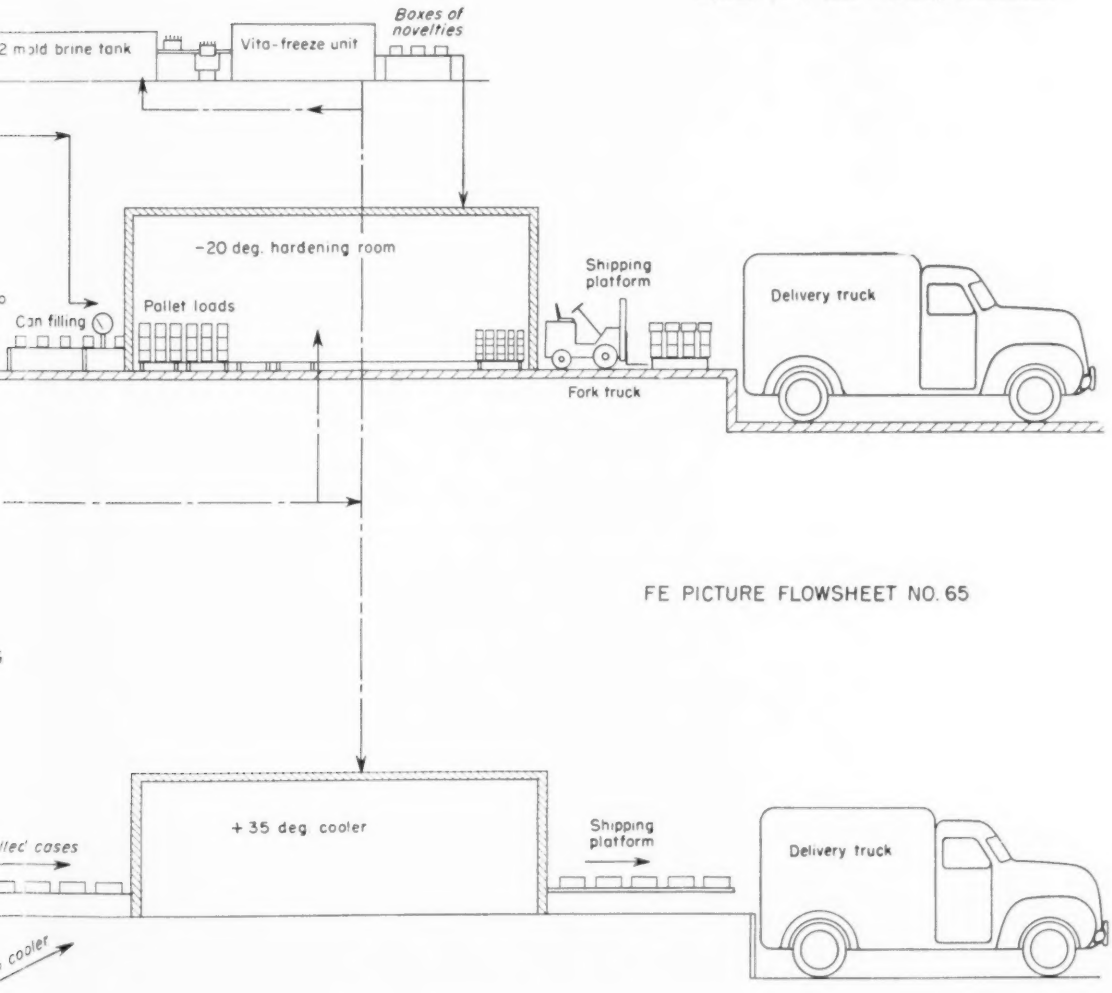


7 **PAPER** containers are used exclusively for ice cream and milk products. Shown are two milk bottle making and filling machines, capacity 89 per min.



8 **COTTAGE CHEESE** department comprises 800 gal. vat and package filler. Powder horn (extreme right) simplifies reconstitution of dry milk solids. It is also used for standardizing ice cream mixes by introducing products into discharge openings of mix storage tanks. Note construction of tile floor with adequate slope to drain that insures quick run-off of liquids; dry, safe working conditions.

STICK NOVELTIES



FE PICTURE FLOWSHEET NO. 65

A Foxboro M-40 Controller holds exact temperature during the critical 8 to 10 second cook in the continuous processing of starch jellies at Charms Co., Bloomfield, N. J.

...with Foxboro Automatic Temperature Control

The uniformity and proper gel strength of 4500 lbs. of starch jelly per hour depend on precise control of cooking temperature by a Foxboro M-40 Hyper-Reset Controller in a new, continuous process at Charms Co., Bloomfield, N. J.

The M-40's sensitive control bulb continuously measures temperature of the cooked jelly as it is pumped from the Votator* heat exchange unit of the process. The fast-acting Controller then immediately corrects the slightest tendency of the jelly temperature to deviate from pre-set control point by positioning the steam supply valve. The desired cook temperature is held precisely, even when load or steam supply pressure varies.

Whether *your* problem involves continuous or batch processing, you can count on Foxboro to furnish the proper control. Write for information or consult your Foxboro Field Engineer.

*Reg. U.S. Pat. Off.

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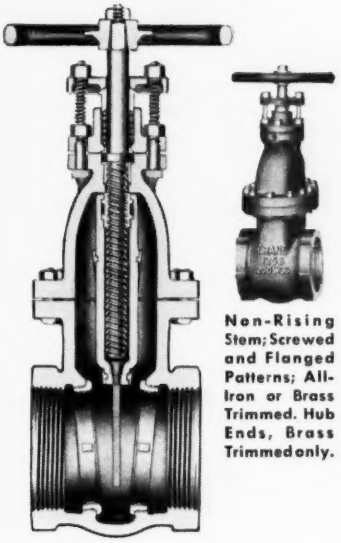

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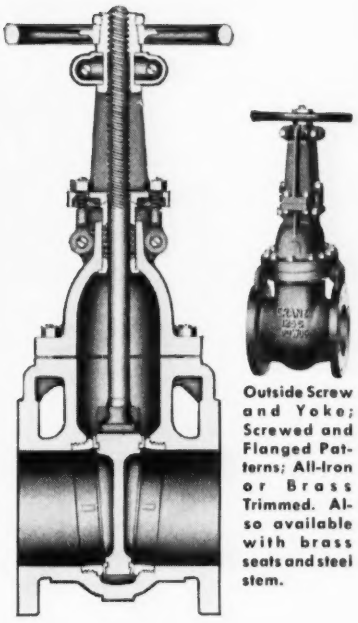

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FINANCIAL AID TO HIGHER EDUCATION

Our Colleges and Universities Face Grave Financial Problems

For the past decade the nation's colleges and universities have been caught in a destructive financial squeeze. It is particularly destructive for the independent, privately endowed institutions. Unless extraordinary measures are taken to relieve this squeeze, it promises to become progressively worse. To let it do that is to court a national disaster.

This is the first of two editorials devoted to the financial plight of our colleges and universities. This first editorial deals with the character of the problem, present and potential. The second will indicate some things that need to be done about it, and particularly what American business might do.

Enrollment Soars, Income Lags

In broad outline, the financial problem that afflicts our colleges and universities is simple. The demand for their services has increased rapidly, and promises to keep on increasing even more rapidly. At the same time, their financial capacity to provide these services has lagged behind, primarily because of price inflation.

Between 1940 and 1950, college and university enrollment increased from approximately 1⅓ million to 2⅓ million—about 75 per cent. Over the same period, the educational income of these institutions, measured in terms of its actual purchasing power, increased only about 64 per cent. Thus, at the end of the decade, our colleges and universities as a group had, on the average, about 6 per cent less to spend per student than they had at the beginning. Meanwhile, the rapid advance of science and technology had made a good college or university course a much more expensive operation than it was in 1940. Since 1950, the latest date for which comprehensive figures are available, the financial squeeze on our colleges and universities has intensified, largely because of another wave of price inflation touched off by the Korean War.

Among the colleges and universities, the independent, privately endowed institutions are particularly hard pressed. In terms of actual purchasing power, the independent liberal arts colleges are now spending at least 20 per cent less per student than they spent in 1940. Public institutions of higher learning, supported out of tax revenues, have managed to increase slightly their expenditure per student. Otherwise, the financial squeeze on higher education as a whole would be even more severe.

Why Independent Colleges Are Hit Hardest

The principal reason why the independent colleges and universities are so hard up is the shrinkage in their income from endowments. These endowments, created in other days by gifts of generous benefactors to help pay the expenses of higher education, have been hit hard from two directions. During the war and post-war years, the tax collector took so large a part of the incomes and estates of wealthy people that this source of endowments has been greatly reduced. Over the same period price inflation cut in half the purchasing power of the income derived from existing endowments. In 1940 income from endowments provided 26 per cent of the total income of the independent colleges and universities. By 1950 it provided only 14 per cent. The figure is still lower today.

The financial plight of the independent colleges and universities is directly reflected in the salary status of their teaching staffs. In mid-1952 a national survey showed that, after adjustment for the increased cost of living, the salaries of those holding full professorial rank in these institutions were 12 per cent lower than they were in 1941-42. Junior teachers, with the rank of instructor, fared somewhat better. In terms of actual purchasing power, their salaries declined only 2 per cent over the 12-year period, largely because there is more direct competition for their services from industry. Over the same period, the real wages of industrial workers increased 55 per cent.

Time Will Not Provide a Cure

The plight of the colleges and universities, which is shared in some degree by all parts of our educational system, is not one that can be left to time for a cure. On the contrary, the financial problems of our institutions of higher learning will be intensified in the years ahead by the pressure of rapidly increasing enrollments. Present prospects indicate that during the next decade college and university enrollment will increase by about one-third, or from 2⅓ million to over 3 million. The problem of increased enrollments will become particularly acute toward the end of this decade when the babies born during the great surge of population in World War II are ready to enter college.

Such an increase in population as that now in prospect can be a tremendous asset to the nation. It is still a truth, even though it is worn a bit thin by frequent repetition at commencement exercises, that a nation has no resource more valuable than the education of its people. And the better the education, the more valuable the asset.

But to realize this, our colleges and universities must have the financial strength to handle the increased enrollments that face them in the years ahead. This means that we must relieve our independent colleges and universities, in particular, from the financial squeeze in which they are now caught and make them full partners in the economic well-being of the nation. Some of the means by which American business might help achieve this will be discussed in a second editorial.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C. McGraw

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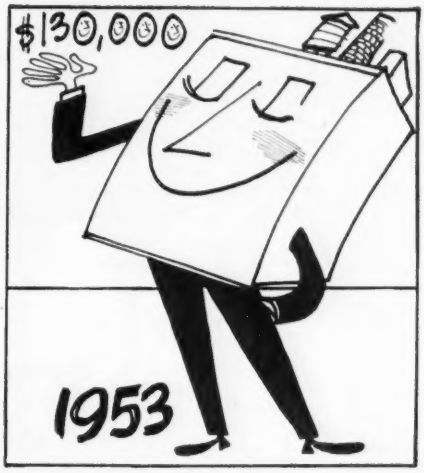
From Red to Black



Without Capital Investment

You can engineer it with a bold boost in output per worker . . . Here's how one company did—going directly from loss to profit and saving the business from bankruptcy

FE STAFF

Launched from top echelons, a few sound principles, backed by careful planning and implemented by industrious effort, can transform "downs" into "ups" in many company ledgers.

This aid to fading profit pictures was spotlighted by J. E. Jury, of Business Collaborators, Inc., at the recent Fact Finding Conference of the Institute of Poultry Industries in Kansas City. Moreover, a pertinent case history was cited.

▶ **In less than a year, the firm in question went from a very shaky position to a solid $130,000 profit!**

Doubling of worker productivity did it—an accomplishment that entailed only practical measures that can be applied by any organization having live top-management perspectives.

Here are the key procedures highlighted in the case history:

1. Top management voiced the challenge to its first-line management—thoroughly informed the foreman and supervisors on present company position and provided them with the complete details of future planning.
2. The union also was given the same complete details.
3. A fair merit-rating system then was installed and fully explained.
4. Wage increases were offered *voluntarily*, well in advance of union demand.

Was in Doldrums

The company discussed by Mr. Jury unquestionably was in a slide. It had lost $125,000 the year previous, and it was behind in its interest and loan payments. Yet the company did have an excellent backlog of unfilled orders.

Then it was that the faith, energy, and sound planning of a farsighted top executive salvaged the situation. And the upswing started immediately after introduction of his changes in setup and procedures. Most important was the fact that company position and planning was made known in detail to all management and also to the union.

Foremen Carry the Ball

Four men from the foremen-supervisory group were singled out for eventual advance to key positions. And each of them was told privately every factual detail of the company's position.

Finally, these men were informed that the only real hope for the company's recovery lay in their seeing the challenge and opportunity. They were also advised that they could not expect any raises in pay for at least six months and even then these remunerations would not be commensurate with the added work responsibilities attending the increased productivity, because creditors would have to be taken care of first.

Furthermore, these men were not even promised that they would be kept in their new posts, since the company could not know in advance whether they would fit in. They were, however, assured that they would not be demoted below their present levels.

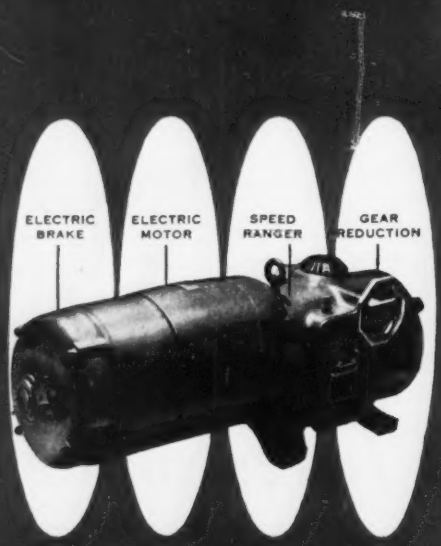
Each of these foremen also was assured that his performance would be rated by his co-workers, and that he, in turn, would participate in judging the performance of the others. Then the basic criteria to be used in these ratings was thoroughly explained.

Union Advised

Before the rehabilitation program began, the union business agent and his accountant were called into a meeting with the supervisory group. Complete facts of the plans were laid before these men.

Particularly, the firm emphasized its wish that there should be no work stoppage, provided management did not violate the existing contract.

As it worked out there were no work stoppages. The few hot arguments over disciplinary measures were amicably settled. And since improved communication had been established, there was a gradual improvement in relations between management and labor.



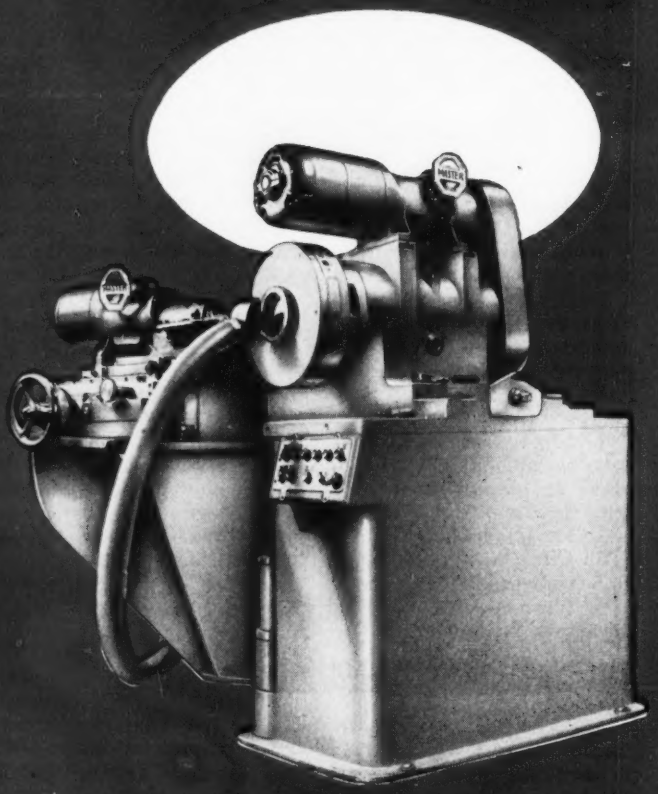
reason

The electric motor, the electric brake, the variable speed drive, the gear reduction unit . . . all are designed so that they easily combine into an integral power drive.

result

The RIGHT horsepower, the RIGHT shaft speed, the RIGHT features in one compact unit that you can use RIGHT where you want it. Only one unit to buy, handle and install . . . saves time, space and money.

Use Master power drives to increase the salability of your motor driven products . . . improve the economy, safety and productivity of your plant equipment. They're the horsesense way to use horsepower.



THE MASTER ELECTRIC COMPANY • DAYTON, OHIO

Then, for the first time, requests were made of management by the business agent. He asked help in setting up a steward-training program, establishing an employees' credit union, and simplifying grievance handling procedures.

During the period that followed, wage increases were voluntarily offered, always well-in-advance of the date the union would serve notice of new wage demands. Avoided were the usual contract-negotiation conflicts. Each of the wage advances was accepted and approved in formal negotiations that concurred with the necessary protocol.

The new plan went into effect in April. By August 1 it was well-established, and productivity (units per man-hour) had risen from 12.7 to 13.1.

From the start, monthly profit took a hold just above the red. Then it rose to $2,000 per month for August and kept on climbing, almost doubling itself each month for the rest of the year!

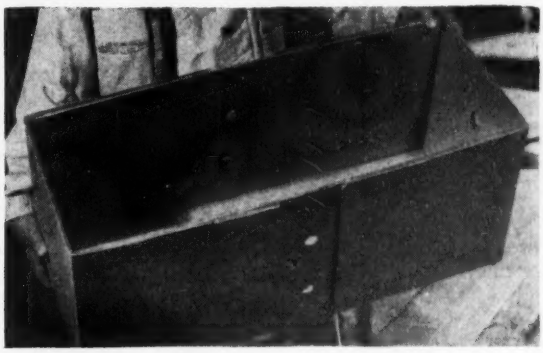
Audited profits for the year, before taxes, were a little over $130,000—in spite of the fact that the period included several of the low months before new procedure was in effect.

From the July productive index of 13.1 units per man-hour the index rose to an average of 28.2 for the last three months of the fiscal year.

More than two years under this successful plan has proved that stimulation of plant productivity results in much more than an increase in the volume of production. It also expands human desire to produce—not only goods but also new ideas and new methods. These latter often surpass productivity in the scales of economic value.

● ● ●

FULL CAPACITY. Paperboard carton takes as much meat as conventional-style wooden box (right) being replaced.



PLENTY OF STRENGTH is assured by method of side-stitching long side flaps instead of box ends.

Paperboard *In* . . . Wood *Out*

Knocks Off 3 Lb. of 'Deadweight' Per Unit

JOHN FAHEY
Spokane Correspondent, "Food Engineering"

For long years the weight of containers has posed a freight-cost problem in the meat packing industry. Expenses of returning empty containers to the plant as well as of transporting those that are filled are "deadweight" charges. Yet, for shipping heavy, perishable meat products, containers must be strong—capable of withstanding rough handling and stacking.

Armour and Company (Spokane, Wash., and Portland, Ore.) has reduced these costs by replacing the heavier, more expensive wooden shipping crates with new lightweight, high-strength, throw-away paperboard boxes.

►At the Spokane plant alone, the company expects to save $18,000 a year on carton and freight costs with this new container.

Used for shipping pork loins, shoulders, and hams to West Coast cities and Alaska, it is produced by Fibreboard Products Co., Sumner, Wash., and assembled at Armour's plants. The first experimental unit was put in use in April 1952, and the containers have been used in quantity since June 1953.

Cost of materials runs approximately 43¢ for each unit, as compared to initial cost of 86¢ for the conventional wired wooden box. Labor costs for assembling either paperboard or wooden boxes at the plant total about 3¢ each. Thus, for every wooden box not returned, savings would amount to 100% of initial cost of a paperboard box.

Additional savings in freight costs accrue due to the lighter weight of the paperboard container. It weighs 5 lb. as against the 8 lb. of the wooden box.

While the paperboard boxes are not returned to the plant, they are used by wholesalers to reship meat to retail outlets.

Packaging strength of the paper unit is equal to that of the wooden box. The new carton (31x12x13 in.) has a capacity of 135 lb. When filled, cartons may be stacked 5 high without danger of crushing the lower boxes.

The knocked-down units are die-cut of 350-lb. test weight, A-flute material. At the plant they are stitched at the rate of 75 to 100 boxes an hour.

They are similar to a half-telescope type box and have a 3-in.-deep lid. Eight holes in the sides and ends provide for product ventilation. Filled boxes are securely wired before shipment.

Satisfaction rests on the carton

In the meat processing industry too,
you will discover the Union trade mark on
more corrugated shipping containers than
ever before. More than half of the major shippers
who use package testing facilities to measure
the performance of corrugated containers
choose Union as one of their sources of supply.

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INTEGRATED PRODUCTION

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For more information, use coupon on page 177.

WILLIAM A. SISTRUNK and JULIAN C. MILLER
Louisiana Agricultural Experiment Station, Baton Rouge, La.

Taste-tempting, eye-appealing—

Sweet Potato Chips

You first select suitable-variety potatoes. Then you cure, pre-heat, lye-peel, slice, oil-fry, air-dry, condition—and they're set for packaging

Quality chips now can be processed from sweet potatoes. This is revealed by recent tests carried out in our laboratories.

Essential, however, is proper curing, storing, and then pre-heating of the potatoes prior to peeling, slicing, and frying.

In 1936, Brunstetter[1] reported that sweets could be made into chips in much the same way as are Irish potatoes. He suggested use of medium-sized to small chips to prevent folding during frying. Also, sweeter and more crisp chips were obtained by heating the unpeeled roots in water at 175-195 deg. F. for 30 min.[2, 3]

Free-flowing oils here were found preferable to solid fats. An initial frying temperature of 340 deg. F. and a finishing temperature of approximately 300 F. gave best results. When exposed to air in damp weather, the sweet potatoes chips were found to lose their crispness. On the other hand, dry atmosphere caused loss of moisture.

Short-term exposure of the roots to low temperature, short-term and low-temperature treatment of sliced potatoes, and treatment of potato slices with diastase were methods evaluated for increasing sugar content of sweet potatoes and accordingly the sweetness of the chips. But none of these procedures proved practical.[4]

Adverse effects of temperatures below 50 F. on the quality of the sweets has been explained in detail.[5] This problem is important to any processor who anticipates making the sweet potato chips, because the dark rings of internal breakdown detract from the bright-color appearance of the chips.

Discoloration caused by enzyme activation during the heating process may be controlled effectively by the length of time and temperature of preheating the potatoes prior to lye-peeling.

Varietal Suitability

Those varieties with a high carotene content result in deep orange color. But yellow-orange varieties are just as attractive when processing conditions are properly controlled. Goldrush, Allgold, and Heartogold varieties produce a deep orange colored chip, while Porto Rico and Earlyport varieties are of a yellow-orange color. To some extent, growing conditions, such as moisture level, soil type, temperature, time and place of planting, and time of harvest, affect the carotene content of sweet potatoes.

Storage Conditions

To obtain top quality chips, sweet potatoes should be harvested before the onset of damaging low temperatures. Curing potatoes 10-14 days at 85 deg. F. and 75-85% relative humidity is essential prior to chipping operation. During curing, there are certain carbohydrate transformations that greatly improve the quality of sweet potatoes, regardless of the cooking method.

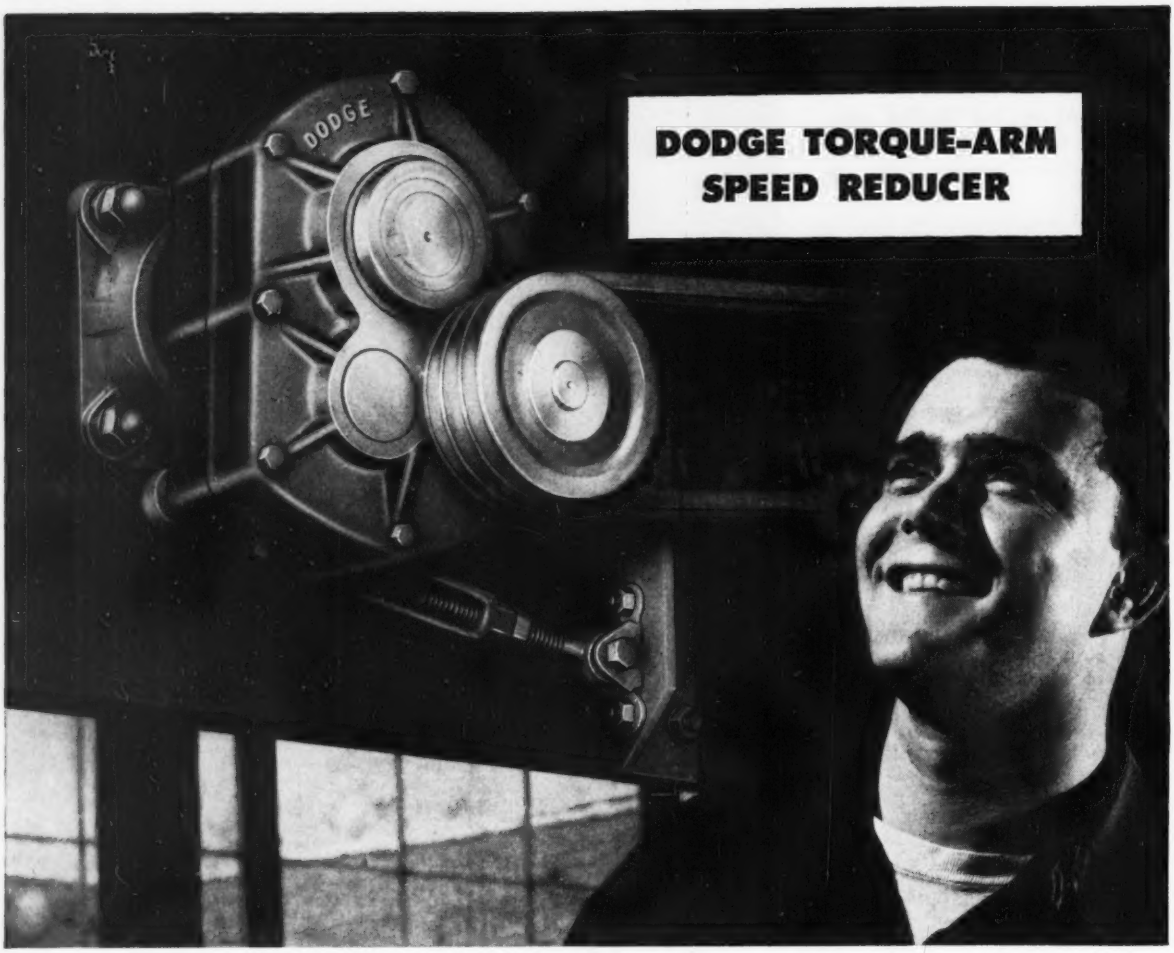
After curing, potatoes should be stored at 60 deg. F.—if they are to be held over three months. Temperatures in common storage are satisfactory up to three months, provided they do not go below 55 or above 70 deg. F. Sweet potatoes held below 55 F. undergo internal breakdown, which probably results from reduced respiration and sugar accumulation. At 70 F., or above, during prolonged storage, there is a breakdown of cell structure and more rapid loss of solids and moisture. Such potatoes produce highly porous, very brittle, and unattractive chips.

Sweet potato chips of excellent quality can be made throughout the year by storing at 60 F. A ready supply of material can be obtained from July to November direct from the field in the sweet potato growing area of the South, and this stock can be cured and immediately utilized.

Pre-Heating Necessary

To gelatinize the starch and alter the cell structure of the potato, preheating is necessary. It makes the

(*Turn to page 152*)



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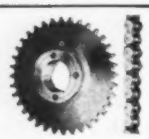

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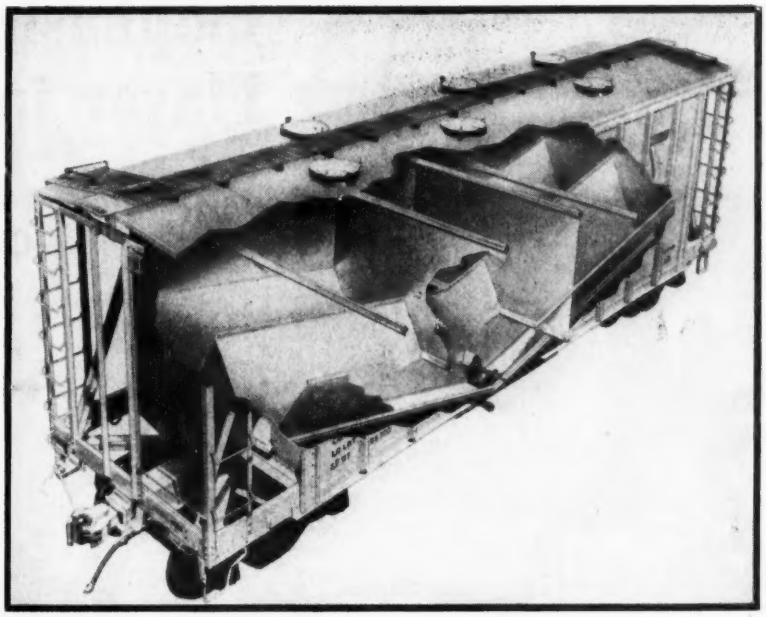
TAPER-LOCK SHEAVES

DODGE-TIMKEN PILLOW BLOCKS

Call the Transmissioneer, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.



GATX AIRSLIDE CAR which General Mills will use in bulk deliveries. Roof-loading hatches are water-tight. Hoppers are divided into twin trenches with blower-supplied aerating fabric chutes at bottom that induce sliding flow. Discharge can be by gravity into hoppers below track, by mechanical conveyor, or by pneumatic system. Railroads pay 3.2c. mileage allowance to shipper.

W. G. HOSKINS

Glenn G. Hoskins Co., Libertyville, Ill.

Bulk-Cost Burdens Eased

Miller leases bulk carriers to deliver flour on no-charge basis to users. See 18c. per-cwt. saving

A potent shot in the arm was administered to the fast-growing program of bulk flour transport just after the first of this year.

This was when General Mills announced to its customers in the macaroni field its readiness to ship durum products in bulk in specially designed Airslide railroad cars.

GM has assumed the responsibility for leasing a number of these cars and will make them available to its macaroni customers without charging them a rental fee.

Macaroni customers naturally are pleased by this turn of events. Since they mostly buy in carload lots, these manufacturers stand to save up to 18¢ or more per hundredweight—before allowing for depreciation of conveying equipment and storage bins—on sack cost, labor, siftage, and shrinkage.

At is was, many processors have long been equipped, or nearly so, to receive bulk shipments. But they have held back because—

1. They didn't want to be committed to a ten-year lease on a fleet of cars—half of which might lie idle during business recessions.

2. They were not sure just how much of the $145 per month lease rate of the GATX cars would actually be washed out by the 3.2¢ mileage return allowance.

It is believed that the new approach by General Mills will stimulate these reluctant processors to "fluidize" idle bulking systems, as well as bring others to complete plans to carry out this type of flour handling.

Of course there is no certainty that other millers will follow the example. But the substantial savings in sack and handling costs to customers should provide strong incentive.

Suppliers Better Equipped

Most flour users feel that the various supply mills, with typical high-volume production, are in much better position to keep a fleet of cars busy than relatively smaller macaroni or baking operations. They reason that it would be highly difficult for the small operation to worry along with a few needed cars—and probably without a traffic manager to keep these in economic movement.

Another deterrent to the processor's interest in bulk handling has been the big investment required in equipment —especially of the desirable pneumatic type—to unload cars and store material. However, experience by a few pioneers has already paved the way to many economies in such systems. And so has the entry into the pneumatic handling field of a number of relative newcomers.

But Look Before You Leap

However, going to an effective bulk-handling system is still a highly specialized venture and should be approached cautiously by processors stimulated by these new developments. Hence, in so doing, it would be well to employ the services of skilled, independent consulting engineers who are schooled in the latest principles and understand component parts of bulk-system design.

In considering a system, the first step, obviously, is to find out what present costs are—not on the basis of a generalized, assumed cost, but in terms of actual measured sack costs, unloading and dumping labor, power, product loss, etc.

For example, costs for handling a carload of sacks have been found to range as much as from 1.5¢ per hundredweight in one plant to 4.0¢ in another. And siftage and sack "cling" loss varies from less than 0.1% to 0.5%. (*Turn to page 196*)

Emphasize Rich Fruit Flavor in your Brand with *Sweetose*® CORN SYRUP

Use Staley's Liquid Sweetener to Bring Out Natural Flavor in Your Jams, Jellies and Preserves.

Sweetose can make *your* brand an outstanding, fast-selling favorite! An enzyme-converted corn syrup, *Sweetose* is Staley's new liquid sweetener that emphasizes natural fruit flavor in all jams, jellies and preserves. It is sweeter, more fluid, more resistant to caramelization than ordinary syrups. Water white, odor and flavor free, *Sweetose* adds no taste except sweetness, gives you these *big advantages:*

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4. Preserves natural fruit colors
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Write now for full details about *Sweetose* and the many advantages it offers in *your* processing.

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Sweetose®

Staley's enzyme-converted corn syrup

A. E. Staley Mfg. Co., Dept. FE-5

Decatur, Illinois

PRODUCTS FROM CORN — Staley's

For more information, use coupon on page 177.

Grappling With That Problem of

Citrus-Waste Odors

LAWSUITS recently have been instituted against two Florida citrus concentrate plants contending that obnoxious odors arise from the citrus wastes. Property owners are the plaintiffs in both cases.

Remedy sought is a court order compelling the companies to comply with such recommendations as the State board of health may order to abate the alleged nuisance.

These court actions highlight a problem with which the citrus concentrate companies and the State board of health have been wrestling for many years without completely satisfactory results in all instances, although some of the plants have succeeded in greatly reducing the organic content of the waste.

Seepage beds and lagoons are the principal methods of liquid-waste treatment. However, neither of these approaches has completely solved the problem, for rapid decomposition of the waste's high sugar content works to create odors and attract insect breeding.

Odors Not Banned

The Florida law prohibits discharge of deleterious substances that may be harmful to fish, livestock, or human beings. But, oddly, nothing is said about obnoxious odors. Hence, the plaintiffs in these suits were obliged to take their cases to court rather than direct to the board of health.

It should be noted that the citrus concentrate plants in Florida long have had an awareness of the waste problem and in most instances have shown a willingness to clear it up. But the rub has been to find an effective method. The difficulty arises largely from the fact that citrus canning waste generally is deficient in sufficient nitrates and phosphates for satisfactory biological treatment. Often lacking also is a favorable oxygen balance to promote aerobic decomposition in the lake or stream into which the matter is dumped in the final stage.

Peel-Oil Case

At one plant, according to a board of health report, a very strong waste is produced in peel-oil recovery. Here, the management has attempted to cope with the situation by concentrating wastes strong enough to require treatment into a single discharge line, leaving weaker but much more voluminous cooling water and barometric leg water from evaporators to be discharged into a canal.

Chemical Precipitation

Strength of waste discharged into this canal has been materially reduced in the past year or two. But the stronger waste still presents a problem.

By the use of a chemical precipitation plant a considerable amount of the organic content has been removed by coagulation with lime and powdered phosphate rock prior to settling in a rectangular clarifier with mechanical sludge removal equipment.

By this method, organic matter has been reduced from an average of 8,540 ppm. to an average of 5,570, or 35%, which the board of health says "is a greater reduction than normally can be expected by the use of this process with citrus waste." Removal of suspended solids by chemical precipitation is, however, declared to be a necessary prerequisite to any biological treatment in this case.

Following primary settling, the waste is discharged into shallow lagoons, from which it is recirculated to mix with the incoming waste, and in which spray irrigating sprinklers are installed in an effort to produce aerobic decomposition of organic matter.

Greater Aeration Needed

An appreciable reduction of the organic content of the waste is achieved, as is shown by the fact that the influent has an average five-day 20-deg.-C. BOD of 5,570 ppm., while the effluent from the last lagoon has an average BOD of 3,490 ppm. Further reduction might be achieved, says the board of health, by greater aeration.

Both heavy and light wastes from the plant eventually find their way into the canal from a lake, but other wastes are discharged into that lake, which also receives the effluent from a municipal primary sewage plant. As the citrus waste consumes the most oxygen, the board of health will recommend biological treatment to reduce the oxygen demand.

Recommendations

How a system not wholly efficient in the removal of organic matter may be improved is the subject of recommendations by John W. Wakefield, chief of the Sewage & Industrial Wastes Section of the Florida State Board of Health. These are:

1. That the citrus plants of this company and the municipality be required to provide suitable biological treatment of the wastes so that a favorable oxygen balance can be maintained.
2. That the best method is a combined treatment plant to be operated by the city.
3. That pilot plants immediately be installed so that full-scale plants can be ready to operate during the next citrus processing season.
4. That surface vegetation in the lake be kept at a minimum.
5. That artificial aeration devices be installed in both of the lake drainage canals.
6. That accelerated aeration be secured in the evaporator cooling water, either by use of spray pipe along the banks of the drainage canal or possibly by use of a spray pond, and
7. That the citrus company be commended for its efforts to date, which, while not sufficient to be considered satisfactory waste treatment, have definitely reduced the pollution load and which is, for this waste, mandatory prior to secondary treatment processes."

Well Water Responsible

In the case of the second citrus firm, an unusual chemical reaction occurs in the effluent some time after it leaves the plant. The effluent is discharged into a drainage ditch that flows into a creek and then into a river.

Here, the trouble from odors goes back to the well water used for the evaporators. This water is almost devoid of oxygen, but contains from 500 to 600 ppm. of sulphates. It comes from the evaporators without picking up any oxygen.

(*Turn to page 145*)

THIS LITTLE PIG WILL GO TO MARKET

in a NEW sales-winning DRUM-TIGHT PACKAGE

Wrapped on our FB Machine.

Bacon packers said "We want tighter, neater wraps for our bacon, and we want a machine that can make them quickly and economically."

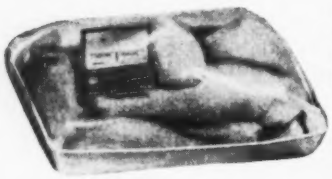
"Package" engineers went to work – and soon came up with a machine that does the trick – our Model FB bacon wrapper. At a speed of 50 packages a minute, the FB turns out drum-tight wraps that set a new standard in attractiveness. Now this machine is wrapping leading brands of bacon throughout the country.

PREPACKAGING MEATS

Another noteworthy development pioneered by "Package" is the wrapping of meat in supermarkets. Here, too, our new Universal 6 machine is stepping up sales and making remarkable savings. With a speed of 40 packages a minute, this machine enables a supermarket to wrap a wide variety of meat *the same day it is sold* – not days in advance as with hand wrapping. Result – fresher looking, more appetizing meat, faster, more profitable sales!

LET US HELP YOU

Our engineering and design staff will be glad to study your packaging problem or any new development you may be planning. Just write or phone our nearest office.



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DALLAS DENVER LOS ANGELES SAN FRANCISCO SEATTLE TORONTO MEXICO, D.F.

Checking Your Supplies

—*Continued from page 79*

in the spec sheets—especially those defects likely to cause production-line stoppages or machine breakdowns.

He must employ judgment, particularly in making borderline decisions and in not over-emphasizing those commonly expected defects. Rejections must be made on the basis of the inspector's experience and knowledge of the material's performance on production lines.

As for defects, they may be arbitrarily divided into—

1. MAJOR DEFECTS, which judgment and experience indicate are only acceptable at an absolute minimum level.

2. MEDIUM DEFECTS, which might reduce the effectiveness of the package for its intended purpose or seriously affect production-line efficiency.

3. MINOR DEFECTS, which do not materially affect usability of the package nor production-line efficiency.

As an inspector becomes familiar with suppliers' methods of packing materials for shipment, he will be able to spot inadequacies and suggest improvements.

Borderline Shipments

Samplings must be carried out economically. To do so requires setting up a statistical sampling system that does not involve the risk of making bad decisions on borderline shipments –accepting those with more than the specified defects or rejecting those that actually meet specs.

To be effective, inspection procedures must be flexible. Suggested is a system of preparing reports on actual production-line performance of packaging materials. In time, such reports will indicate what inspection changes must be made.

In collecting samples pick them up at random from a shipment–and in an impersonal, unprejudiced manner. To be fair to a supplier, don't include samples from a damaged shipping case or similar package.

With the proper amount of samples selected, next step is to determine, in accordance with an inspection plan for each material, the number of defects according to the three categories –major, medium, and minor. These findings should then be used as a guide for accepting or rejecting a lot.

Lots are acceptable only when inspections show that they meet specs. Non-acceptable lots should be reported by the inspector to his supervisor who, in turn, is responsible for rejections.

As for sampling plans, proposed are: Single sampling plans for inspecting packaging materials from shipments containing up to 800 pieces, and double sampling plans for lots over 800 pieces. Such plans might call for normal inspections at reduced levels, and tightened inspections at a normal level.

Suppose, for example, the lot size is in the 500-800 pieces range and the inspection is to be carried out at a normal level. Then, after examining 75 pieces from the shipment, the lot might be accepted when 0 major, 3 medium, or 6 minor defects are detected. But the same lot might be rejected if there are 1 major, 4 medium, or 7 minor defects.

Handling Rejections

If an inspection on the same lot is conducted at a reduced level then, after 35 pieces are checked, the shipment can be rejected if 1 major, 2 medium, or 3 minor defects show up.

A tightened inspection might call for checking 75 pieces, and then rejecting the lot when 1 major, 3 medium, or 5 minor defects are found.

Shipments with a smaller number of pieces (less than 500) require fewer samples for inspections and fewer defects for rejections.

When a rejected lot is returned to a supplier, he may check it, and then remove or repair defective pieces before re-shipping. This re-submitted lot can then be re-inspected by the food packer at either a normal or tightened level, and checked either for all types of defects (major, medium, and minor) or merely for the specific type of defect causing rejection.

A pre-arranged number of samples for inspections at a normal level should be selected when new items are shipped or new suppliers are handling orders. After, say, five successive shipments have been accepted, samplings and inspections may be carried out at a reduced level. But should a lot then be rejected, samplings and inspections should then revert back to the normal level.

Tightened inspections should be reinstated if there are excessive defects in use of a material during production or if the defects slow down normal production. When five successive lots have been accepted by tightened inspections and production is not adversely affected, then the food packer might revert back to the normal-inspection level.

With an efficient sampling system now set up, what should we look for in glass containers, for example, and what should we check them for?

Glass containers must first conform to dimensional tolerances indicated on a specification sheet and an attached drawing. Shipments, for instance, should not contain an excessive amount of major defects (choke necks), medium defects (bulge, concavity, rocker bottom, out-of-trueness, protruding seams, waviness, or defective finish), or minor defects (blisters, stones, seeds, checks, or washboard).

Carrying Out Inspection

To be suitable, containers should be checked for—

1. **Dimensional tolerances,** with proper instruments. The same type of gage or instrument should be used, where possible, by food packer and supplier to insure uniform results. Those tolerances exceeding functional, allowable dimensional tolerances are judged medium defects.

2. **Neck finish** of bottles and jars shall be checked for dimensional tolerances on a drawing and specification sheet.

Outside neck diameter, including the

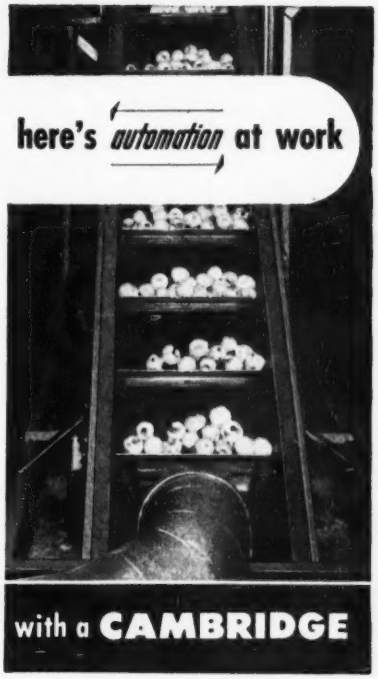
INGREDIENT SPECIAL COMING

In the June issue of FE you will find a special section with several feature articles on ingredients used to improve the taste and quality of food products. These articles will tell you where to use the materials, why, how, and how much. This will be information that you can put to work.

Here are some of the articles:

The Expanding Use of Antioxidants
MSG—A Unique Flavor Enhancing Ingredient
Dry Soluble Seasonings
True Fruit Flavors
Ascorbic Acid In Meat Products
Dietetic Foods
Sugars
Newer Knowledge of Nutrition
Present Status of Chemical Additives

A dozen or more regular features, which will help you and your company to solve your problems and initiate progress, also will be presented in the June issue.—The Editors



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Sliced apples are soaked, washed and cooked on Cambridge Woven Wire Conveyor Belts. Entire operation is *continuous, automatic,* eliminates manual handling and batch operations.

Regardless of process temperatures or corrosive conditions, Cambridge Woven Wire Conveyor Belts can help you cut manufacturing costs by contributing to automation — continuous, automatic production.

They're all metal, and can be woven from any metal or alloy. Thus, they are impervious to damage from heat, cold or moisture. Open mesh construction allows free circulation of process atmospheres, free drainage of process liquids. Available in varied specifications for varied loads. Side and surface attachments available to hold bulk materials for flat or inclined movement.

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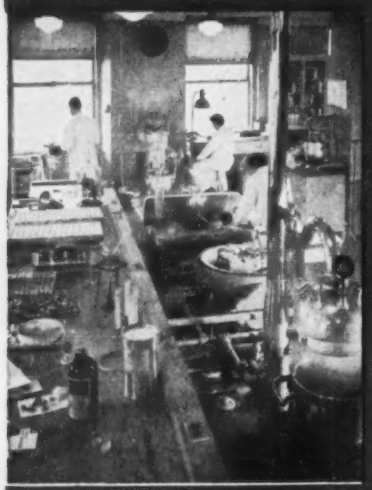

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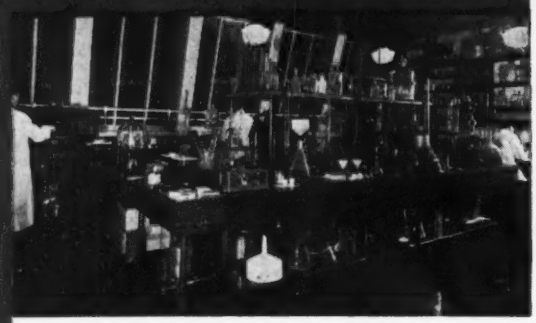
NULOMOLINE is hygroscopic . . . attracts, retains, and equalizes distribution of moisture . . . retards crystallization . . . increases osmotic pressure . . . stabilizes density of syrup portion . . . resists fermentation . . . controls texture and consistence . . . promotes product uniformity . . . improves taste and appearance.

USE NULOMOLINE . . . THE HYGROSCOPIC HUMECTANT . . .



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threads, as well as outside diameter between threads, should be checked with a go-no-go gage.

Warped finish—a medium defect—will prevent proper sealing of glass containers.

To check neck finish further, see how approved caps can be applied to a bottle. Screw caps must go on easily, and adequately seal the container. And the cap skirt should not rest on the bottle's neck ring.

Inside neck diameter should be checked with a machined plug gage of correct diameter (as shown on blueprint or specification sheet). Choke necks are rated major defects. All other neck defects are judged medium, if functional.

3. **Out-of-trueness**—a deviation from true perpendicular—is measured by a pointer attachment on a height gage or by a specially designed measuring device. Variations from true perpendicular should not exceed $\frac{1}{16}$ in. for bottles up to 4½ in. high, $\frac{5}{64}$ in. for 4½ to 7-in.-tall bottles, $\frac{7}{64}$ in. for 7 to 10-in.-high bottles, and $\frac{1}{32}$ in. for 10 to 12-in.-tall bottles.

Where practical, limit standards should be used to check trueness, since deviations may seriously affect cleaning, filling, and capping machines. Defects in excess of established limits are medium defects.

4. **Bulge,** if excessive on the label surface, will interfere with labeling, and is judged a medium defect.

5. **Waviness**—a series of bulges—is detected by placing a straight edge against a container. It is considered a medium defect, since labeling then cannot be carried out efficiently.

6. **Bearing Surface.** Bulged-bottom bearing surfaces are commonly referred to as "rockers," and can be checked with limit samples kept by packer and supplier. Excessive rockers are not acceptable and judged medium defects, since they adversely affect operations of cleaning, filling, and capping machines.

7. **Protruding Seams** are visually detected. Except for finish surface, protruding seams should be checked with samples kept by supplier and packer. Protruding seams in these areas are minor defects. Those on the finish, however, may seriously affect the seal or closure, and are judged medium defects (if functional). Where indicated, protruding seams should be checked with a standard, approved cap to determine proper sealing or if protruding thread seams cut into the cap.

8. **Fill point,** where specified, is determined by merely filling a glass container with room-temperature water from a burette—to pre-marked ideal, maximum, and minimum fill

THIS KARTRIDG-PAK LINKING MACHINE, together with its accessory equipment, is sanitary, easy-to-clean Stainless Steel. Oscar Mayer & Co. was instrumental in developing this machine, now manufactured by the Kartridg-Pak Machine Co., Chicago.

THIS SPOTLESS BACON LINE at Oscar Mayer & Co., Chicago, makes liberal use of Stainless Steel. The high-speed slicing machine, bacon line stations, conveyor, rollers and other components – all Stainless – were obtained from the Allbright Nell Co., Chicago. Stainless Steel scales are by Exact Weight Scale Co., Columbus, Ohio.

For highest standards of sanitation

Oscar Mayer

FINDS YOU CAN'T BEAT STAINLESS STEEL

Oscar Mayer & Co., in its 71 years of growth from a small Chicago retail meat market to a nationwide meat processing organization, has constantly sought modern methods and modern equipment. That's why Stainless Steel has played such an important role in their operations.

One of the Company's major developments was the Kartridg-Pak Linker for wiener production. This linker receives a 55-foot length of stuffed cellulose casing, marks off predetermined link lengths, and twists the casing to form links. The linker has maintained production of more than 50,000 pounds for a 40-hour week. It is of Stainless Steel construction.

Like all other processing equipment in the Oscar Mayer plants, this machine is washed down daily and then scrubbed with soap and brushes and disinfected at night. Continual washing and scrubbing, to say nothing of salt in the meat, would cause a corrosion problem if it were not for Stainless Steel.

Other important applications of Stainless Steel in the plants include smoke sticks, work tables, bacon slicing machines, conveyors, rollers, scales, cook kettles, and many more. In every case, Stainless Steel has earned its place by doing a better job of maintaining top standards of cleanliness, sanitation and good appearance. It doesn't discolor, chip, or peel, and it withstands salt corrosion.

No matter what you process, there's a place in your operation where Stainless Steel can do a better job at lower eventual cost. Use it, and when you do, specify perfected, service-tested USS Stainless Steel.

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NO "THROAT-CHOKE" IN BALL BOTTLES!

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No random "sample" inspection, at Ball —every narrow-necked bottle is checked on a scratch-proof throat gauge to make certain that the filling machines in your plant will be able to handle each container without "throat-choke."

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points. If the specified amount of water fills the container to, or above, minimum fill point, and to, or below, maximum fill point, then the container is acceptable. Fill point in certain bottles may be extremely important, and variations from allowable tolerances are considered medium defects.

9. **Weight.** Sample bottles are weighed on an accurate scale, and the weights then checked to see if they conform to a limit specified on a blueprint and specification sheet. Variations outside tolerances are considered minor defects.

10. **Visual defects,** such as blisters, chips, washboards, double seams, stones, checks, and seeds, are visually checked and compared against limit-acceptable samples held by packer and supplier. Those defects, exceeding limit samples are minor defects.

Additional information will appear in subsequent issues of FOOD ENGINEERING, *discussing inspecting of plain cartons, display cartons and corrugated shipping containers.—The Editors.*

End (*Resume reading on page 80*)

X-Ray Spotters

—*Continued from page 65*

were found unsuitable for low voltage radiography because of excessive and non-uniform X-ray absorption of the cardboard used. A holder consisting of two Wratten filters, as suggested by Trout, *et al*[8], did have uniformity of transmission. Nevertheless it was objectionable because of excessive filtration and high cost.

Various plastic materials were investigated, and a very satisfactory solution was found with use of black lacquer-coated Mylar film (a polyester plastic marketed by du Pont). The lacquer had to be specially formulated for proper adherence and spread. Its shrinkage value had to correspond to that of the plastic, otherwise cracking and peeling would occur.

Mylar is tough in relatively thin sheets and has very low absorption for low voltage X-rays. It proved an ideal material for both film holder (cassette) front and sample tray. When used for the latter, no black lacquer is required.

Because Be is the most X-ray-transparent structural material known, it is generally used as an index of comparison for transmission qualities. Data show that 0.005 in. (5 thicknesses) of Mylar is equivalent in absorption to 0.04 in. of Be at 10 kvp. At 25 kvp., absorption of 5 thicknesses of plastic is comparable to 1 mm. Be, and the reduction in density is insignificant.

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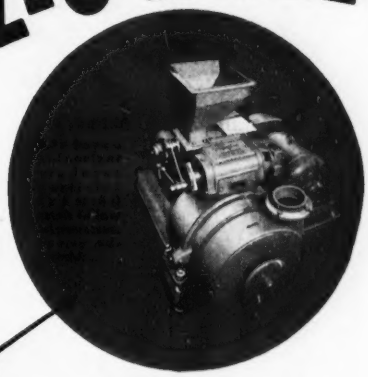

PULVERIZE

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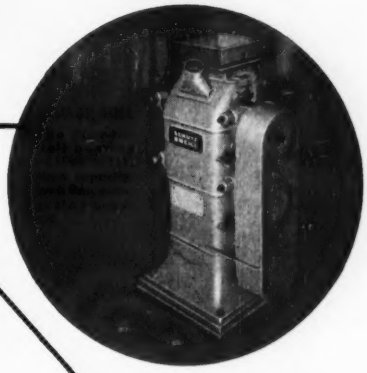
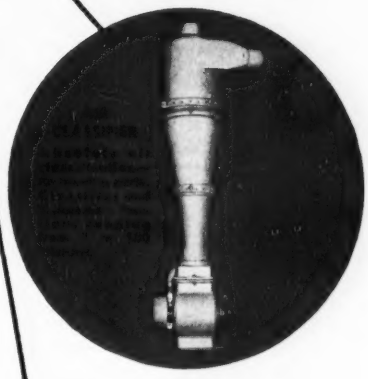
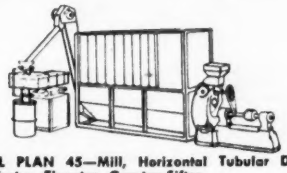


CLASSIFY BY AIR

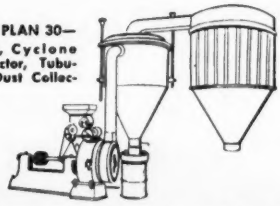
SEPARATE BY SIFTING



Consult SCHUTZ-O'NEILL *Engineering Service for Mill Plans*



MILL PLAN 45—Mill, Horizontal Tubular Dust Collector, Elevator, Gyrator Sifter.



MILL PLAN 30—Mill, Cyclone Collector, Tubular Dust Collector.

Illustrated here are two from a large variety of Mill Plans, suggesting efficient operating setups for any material or plant layout. If you will advise us of your requirements, Schutz-O'Neill Engineers will recommend a suitable mill plan and equipment for your own use.

Write for circular and name of SCHUTZ-O'NEILL Sales Engineers nearest you.

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HEADQUARTERS FOR SCALES

An industrial, fine-grained X-ray film is recommended. This film has a double emulsion and is readily procured from manufacturers.

Inspection of seeds—such as coffee, cocoa, navy beans and cottonseeds—can be carried out in a manner similar to that of grain. We feel that the radiographic method should prove to be of great value to importers of cocoa and coffee beans. It should also prove useful to government officials responsible for inspection of such imported items.

References and Bibliography

1. R. Katz, M. R. Lee and M. Milner, "X-Ray Inspection of Wheat," *Jour. Soc. for Non-Destructive Testing*, Vol. IX, No. 2, 16-18, Fall 1950.
2. M. Milner, M. R. Lee and R. Katz, "Application of X-Ray Technique to the Detection of Internal Infestation of Grain," *Journal Economic Entomology*, Vol. 43, 933, 1950.
3. E. D. Trout, R. M. Gager and A. L. Pace, "Possible Industrial Applications of Soft X-Radiation 15 to 100 Kilovolts," *Jour. Soc. for Non-Destructive Testing*, Vol. VII, No. 3, 20-24, Winter 1948-49.
4. M. Milner, "Recent Developments in Methods for Detecting Internally Infested Wheat," *Northwestern Miller*, Section Two, Vol. 245, No. 2, 1a, 6a-11a, 1951.
5. K. L. Harris and J. F. Nicholson, "Evaluation of X-Ray Inspection Techniques For Insect Damage To Wheat," *Northwestern Miller*, Section Two, Vol. 248, No. 20, 8a-11a, 1952.
6. R. K. Johnson, "X-Rays Spur Infestation Control," FOOD ENGINEERING, 75, Sept. 1952.

End (Resume reading on page 66)

Rheology Opens Frontiers

—*Continued from page 78*

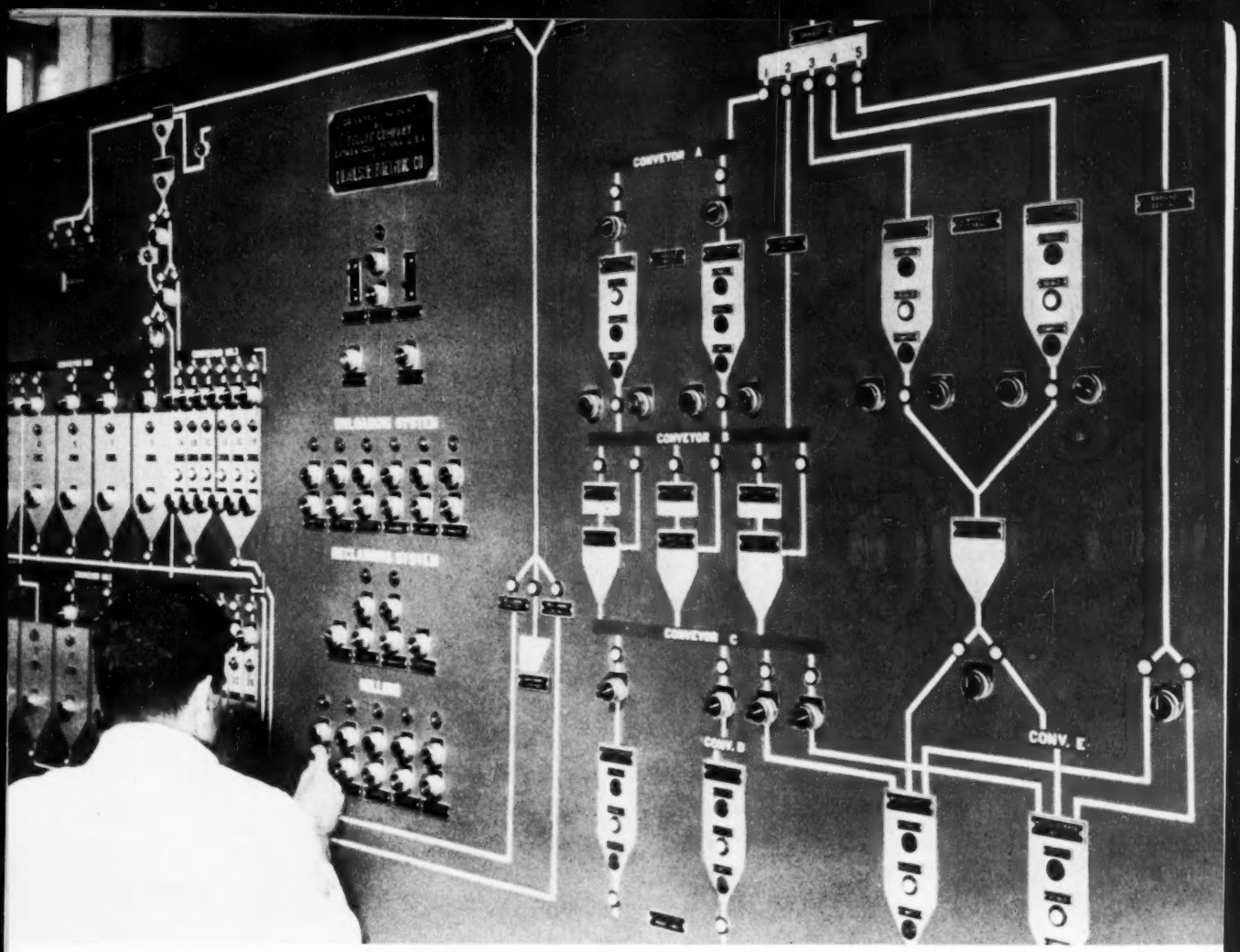
causative factors of certain rheological properties is fundamental to eventual control of these properties—and subsequent "building-in" of desired ones.

Basic studies with the instrument now are focused on the influence of rheological qualities on the volume and texture in baked products from various doughs. Overall size of a baked product is governed by balance between expanding force of generated carbon dioxide, or existing bubbles, and the restraining force in the dough. And, accordingly, rheological studies should reveal much about this balance. Further, the actual size, shape, and uniformity of gas bubbles, as well as uniformity and thickness of cell walls, are at least partially controlled by rheological factors.

Currently, Dr. Joslin and his associates have developed some very interesting data along the above lines. However, they believe it would be premature to report them at this time.

One thing can be stated, however: Expansion of their studies already has pointed to greater objectivity in the selection of ingredients and in manipulation procedures involved.

End (Resume reading on page 79)



Plan electrical operation to lower your food processing costs

WESTINGHOUSE CAN HELP YOU BY . . .

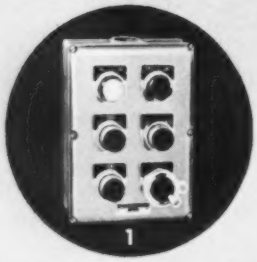
1. Engineering electric drives to boost quantity and quality

2. Improving electrical system reliability

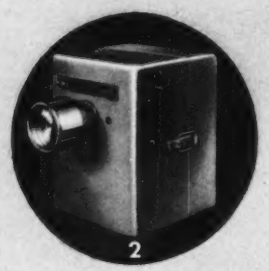
Here, one man feels the electric pulse of an entire grain handling system moving 2000 bushels of malt and other ingredients an hour. Manual handling costs are eliminated because Westinghouse electrical planning coordinates power for more efficient centralized operation. It is this ability to organize and engineer electricity that Westinghouse offers to solve your problems in lowering processing costs. When you call on Westinghouse, you call on a team of design, manufacturing and engineering specialists familiar with all the electrical apparatus needed to improve any step in your processing operation.

For example, look at this bakery . . .

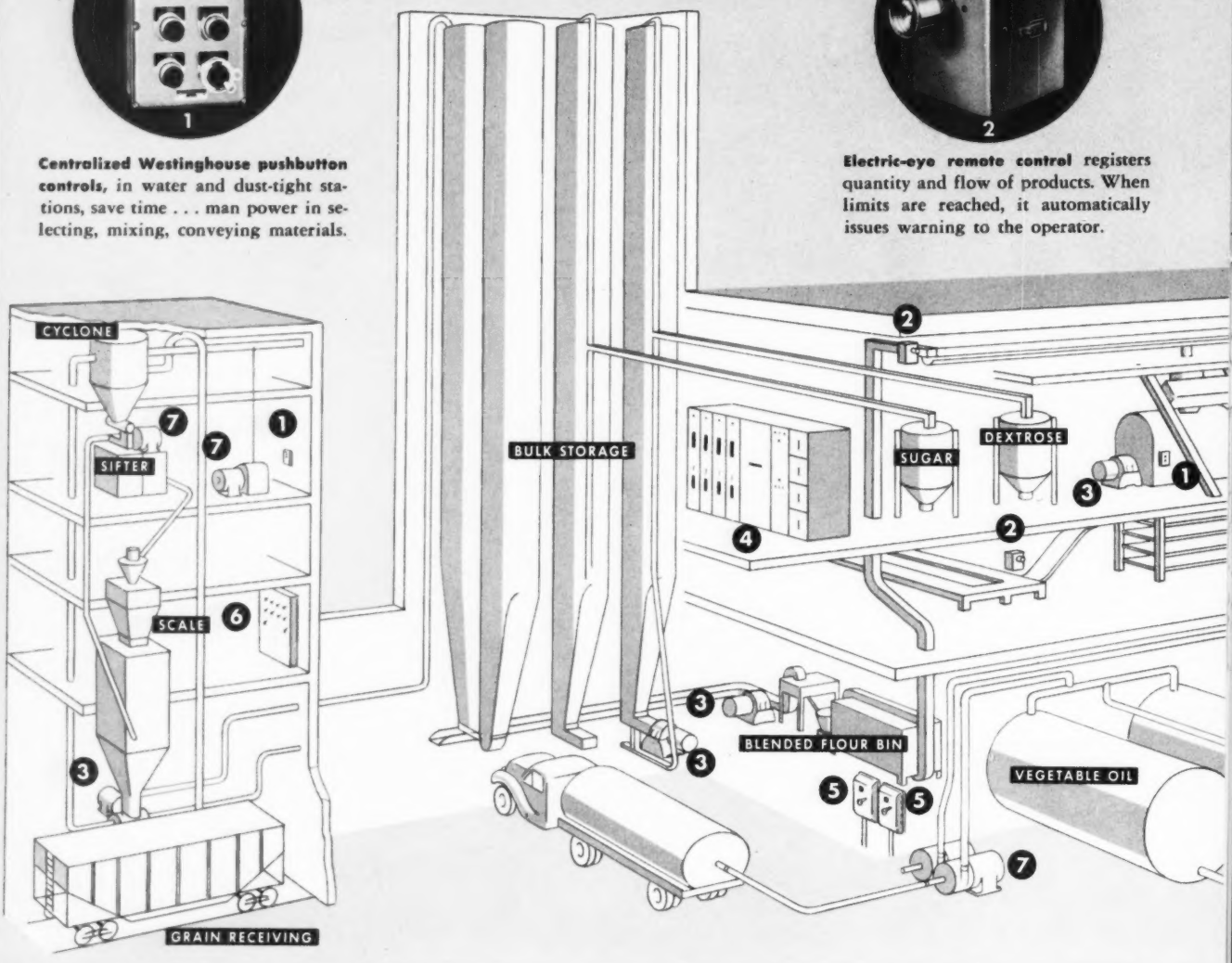
Page 1 of 4 in this section

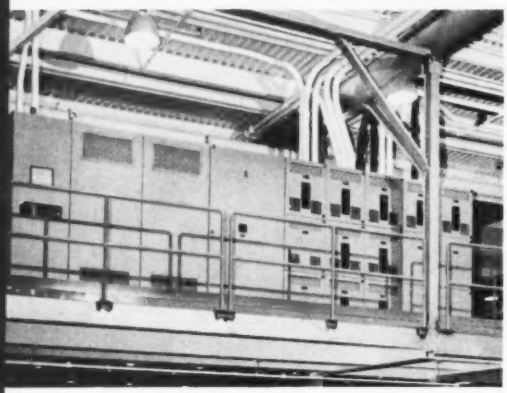


Centralized Westinghouse pushbutton controls, in water and dust-tight stations, save time . . . man power in selecting, mixing, conveying materials.



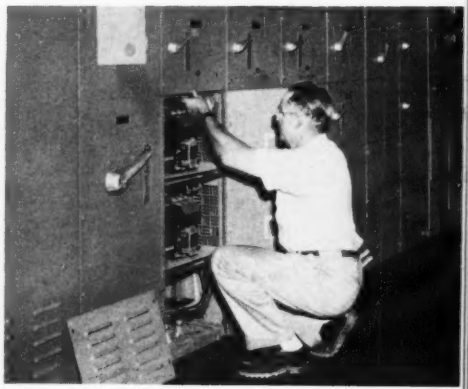
Electric-eye remote control registers quantity and flow of products. When limits are reached, it automatically issues warning to the operator.



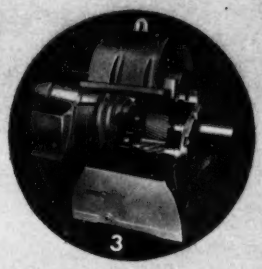


4. Westinghouse power centers improve service continuity and voltage regulation. Standardized, low-voltage circuit breakers allow for economical expansion. Dry-type construction makes the factory-assembled unit lighter and safer.

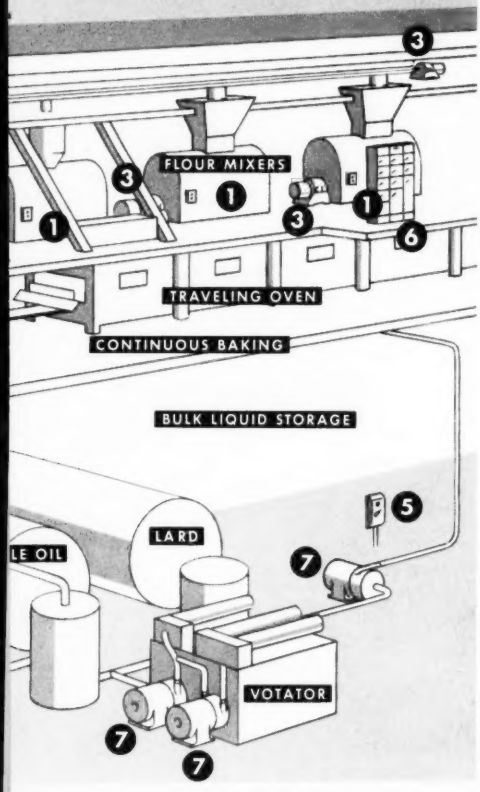
5. With AB-1 circuit breakers you minimize shutdown time three ways: First by not interrupting power on harmless overloads. Second, by allowing you to restore power with a flip of the handle. Third, by preventing over or under fusing.

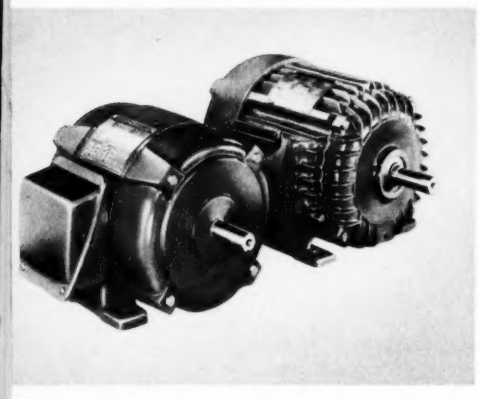


6. Control centers for process motors centralize control in protected out-of-the-way areas. They simplify interlocking of process drives by coordinating motor control in a single group easily serviced by one man.



Compact Westinghouse gear motors have horizontally split gear case to simplify inspection and care without dismantling or disconnecting the load.





7. New Life-Line "A" motor. Bondar insulation has high thermal resistance, a life expectancy of more than 3 times conventional insulations. Bondite impregnating varnish is silicone reinforced to resist vapor, oil and chemicals. New, 4-way sealed pre-lubricated bearing cuts maintenance costs.

Low cost, fluidized handling results from . . .

Electrical system reliability and . . .

A typical high production plant, this bakery operation must be assured continuous electric power from start to finished-wrapped loaf. A failure at any point means interruption of the whole cycle, loss of product, and operating costs skyrocket.

Organizing power distribution into a network system, Westinghouse engineers answer the demand for service continuity. Power is distributed at high voltage by dual feeders going to power centers (4) in load areas through the plant. Each power center transforms voltage to a secondary utilization level for the load in its area.

Serving continuity is assured by a secondary voltage tie circuit that permits the plant load to divide among the power centers. Thus should trouble occur in one part, the load is picked up by the remaining power centers without service interruption. In addition, this network arrangement enables you to extend the system in any direction, at any time, with minimum rewiring and production loss.

Drives engineered to boost quantity and quality

Centralized control and dependable Life-Line® "A" motors (7) and Westinghouse gearmotors (3) are engineered for dependable, continuous service necessary in a high production cycle. Westinghouse pushbutton stations (1), control panels and motor control centers (6) are highly flexible for location at the center of any operating area.

Intelligence from remote control and electric eye devices (3) can be fed into these operating centers to automatically indicate and operate any sequence of motors. Life-Linestarters can provide up to three interlocks for a maximum of sequencing operations. Interlocking also prevents jam ups in case of overloads or equipment failure.

The four-way seal, pre-lubricated bearing assembly of the new Life-Line "A" motor is another important answer to insuring continuous service. Sealed and pre-lubricated at the factory, these bearings eliminate the cost of greasing maintenance. Dust, dirt, and moisture are sealed out so that bearings are never contaminated; grease can never leak out; sanitation is improved.

YOU CAN BE SURE...IF IT'S

Westinghouse

Next page, add a working partner from design through installation . . .

How Westinghouse field engineering helps meet your need for low-cost operation

Application engineers speed equipment installation time, eliminate problems right from the start. They work with your staff, help match the correct electrical apparatus to the job. They not only install Westinghouse equipment, but test it to assure proper operation.

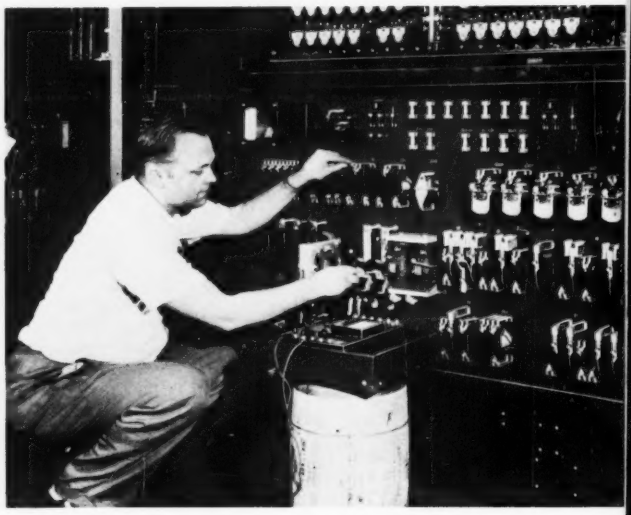
Manufacturing and Repair Plants – 38 large and well-equipped Westinghouse apparatus repair shops are available to you for maintenance jobs on all types of electrical equipment. These shops are spotted in key areas to provide factory-type repairs at a local level.

Back-up spare parts inventory—Westinghouse Renewal Parts Warehouses are located in 31 convenient cities. They're open 24 hours a day. You get genuine replacement parts fast.

For further details your Westinghouse representative will be glad to answer any questions you may have concerning information in this section and get you a copy of any of the literature listed below, or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania.

Bus Duct	B-5835
AB-I Circuit Breaker	B-5456
Dry-Type Transformers	B-5920
Control Centers	B-5621
Hi-Voltage, Metal-Clad Switchgear	B-5306
Low-Voltage Switchgear	B-5282
The New Life-Line "A" Motor	B-6154
Life-Line Gearmotors	B-5645
Life-Linestarter	B-4677
Complete Industrial Control	B-6051
Speed Reducers	B-5646

In planning, you get the services of 56 Westinghouse Field Engineering Offices—a nationwide network of engineering, consultation and application assistance.



In servicing equipment that cannot easily be moved, Westinghouse engineers get to your plant quickly for inspection, adjustments, or on-the-spot repairs.

YOU CAN BE SURE...IF IT'S Westinghouse

MP3005

Citrus Waste Odors

—*Continued from page 133*

Hot water discharged from fruit and molasses processing is discharged into a ditch, where it mixes with fruit wash water, the combination having 75 ppm. BOD. Lacking in sufficient oxygen for acrobic decomposition, the wastes, containing a considerable volume of solids, cause the sulphates in the water to turn to sulphides, then when farther downstream oxygen is picked up, the hydrogen sulphides change to colloidal sulphur and give off an odor three-quarters of a mile from the plant.

30-Day Ultimatum

In this case, the court gave the company 30 days to comply with requirements of the State board of health for changes designed to remedy the situation.

The board of health continually is studying the various methods essayed by the plants to solve the problem, following a comprehensive survey conducted last year in cooperation with the Florida Canners Assn., which defrayed two-thirds of the cost, and the U. S. Public Health Service, which paid the other third.

Results of that and subsequent studies will be presented by John W. Wakefield at the Industrial Wastes Conference to be held May 10-12 at Purdue University.

5 Findings

Work currently being done in Florida is based on findings of the joint survey, which concluded:

1. That trickling filters operated either in series or at high recirculation ratios (6:1 and 8:1) offer practical means of treating citrus processing liquid waste, with the addition of nitrogen and phosphorus increasing their performance.

2. That under the most extreme conditions the waste that needs treating should not be over $\frac{1}{10}$ the volume of the clear water, which has a usual BOD of around 20 ppm.

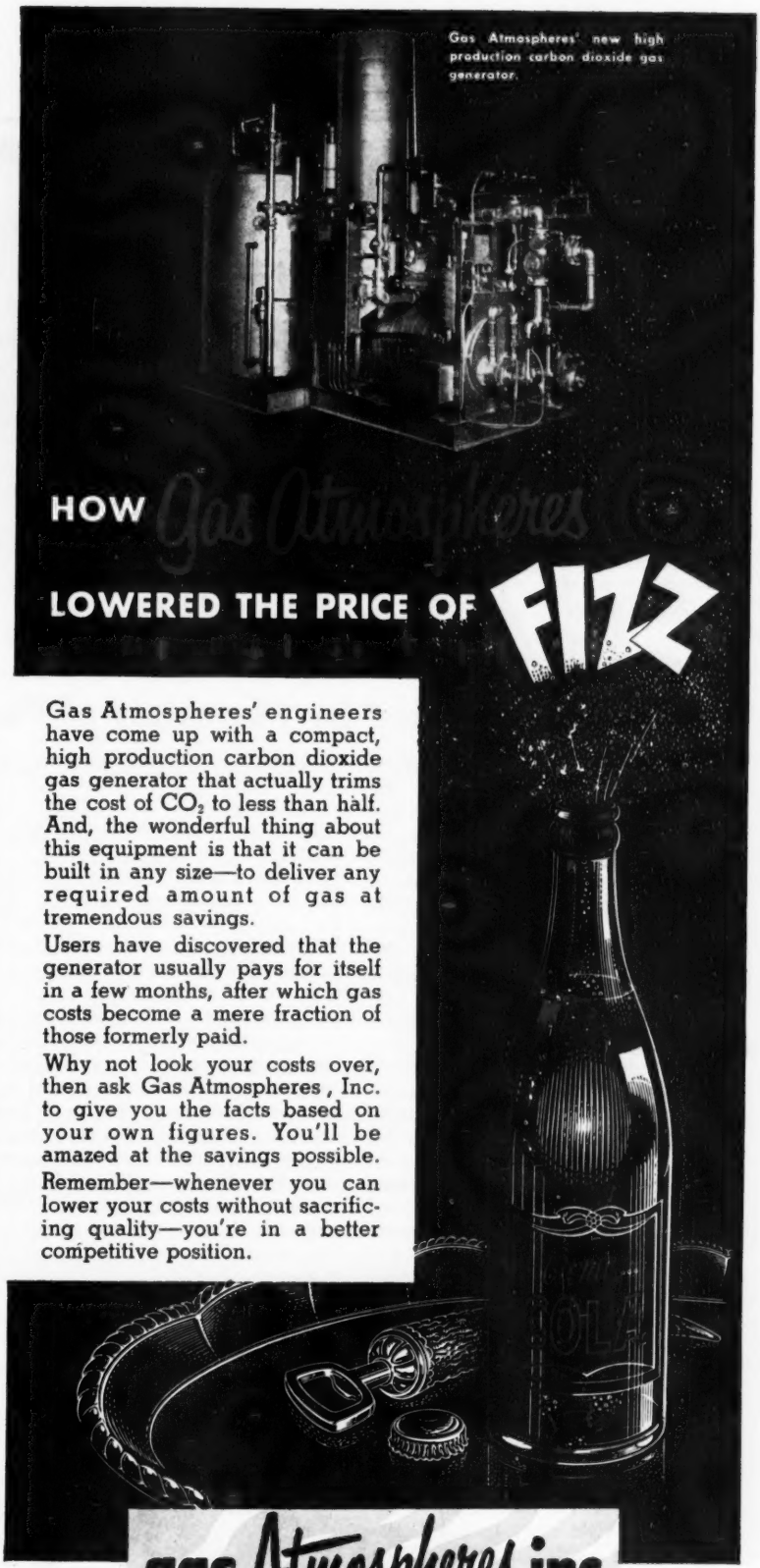
3. That a nutrient feed of 50 ppm. and 20 ppm. P_2O_5 gave the highest and most uniform performance of the filters.

4. That limestone would prove to be a satisfactory ballast for filter treating.

5. That the activated sludge method also offers a practical means of treating this waste.

This survey was regarded merely as a point of departure, and study of the problem still goes on.

—*End*—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Users have discovered that the generator usually pays for itself in a few months, after which gas costs become a mere fraction of those formerly paid.
Why not look your costs over, then ask Gas Atmospheres, Inc. to give you the facts based on your own figures. You'll be amazed at the savings possible.
Remember—whenever you can lower your costs without sacrificing quality—you're in a better competitive position.
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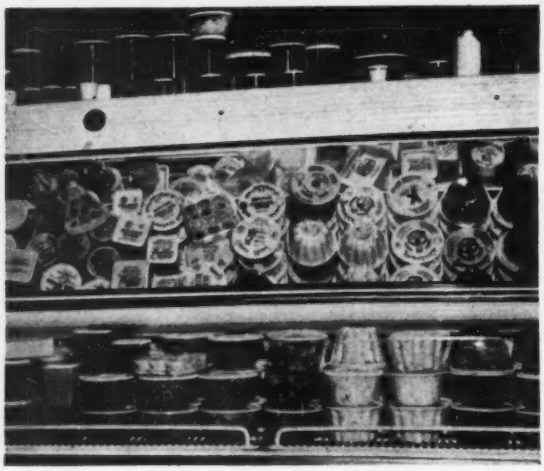
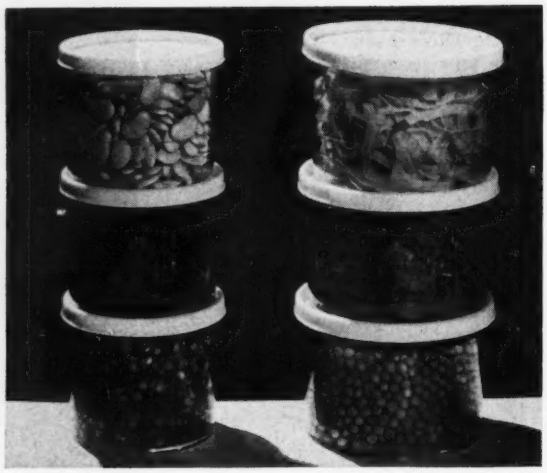
NEW PACKAGES & PRODUCTS





STYRENE CONTAINERS lend color and attractive display advantage to refrigerated showcase (left). Note particularly molded containers for gelatine products and variety in shapes. Used for dry bulk products (right), containers feature full product visibility.

Machines Crowded by Materials at Packaging Exposition

"The materials are beginning to catch up with machines" was the telling comment of a visitor to the 23rd Annual Packaging Exposition at Atlantic City last month. Demonstrations of noteworthy developments in new packaging materials, particularly plastics, and new applications for conventional materials, had shown the opening of new fields in packaging.

Coming up fast in all-around food packaging lines was a series of colorful styrene jars with styrene or polyethylene lids. Closed with Polycel, a lamination of polyethylene and cellophane, with scotch tape, and cinch-sealed with a locking lip inside the lid, the styrene container may be used for attractive and inexpensive packing of food ranging from salted nuts and honey, to soup mix and shrimp cocktail. Offering complete product visibility and attractive display features, the jars are not heat processed, but are designed for distribution in refrigerated trucks and retailing in refrigerated display cases.

Ranging in size from 1-oz. to 50-oz. in size, and available in round, square, wedge, and rectangular shapes, the containers have a re-use value for the consumer. Brand identification is possible on the opaque lid.

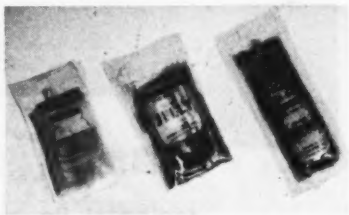
Polycel, a polyethylene-coated cellophane, and Cellothene, a lamination of the two materials, have been introduced. Applied to the portion control line, Cellothene is being used by Custom-Pak, Inc., Cincinnati, as a package for jelly, mustard, and catsup. Polycel is manufactured by the H. P. Smith Paper Co.

Combining the best properties of both films in a single low-cost material, Polycel features liquid-holding advantages, and has been proved applicable for vacuum-packaging and for the packaging of frozen foods.

The familiar saran has been chosen by Swift and Co. for their cheese line. Saran, made by Dow Chemical Co., Midland, Mich., is used for wrapping of Swift's Brookfield brick and special cure brick cheese in 12-oz. consumer packages, and the newly released 48-slice institution pack. Featuring high resistance to moisture, saran prevents drying out of the cheese and insures protection during handling by shipper and consumer. Due to pliability, film conforms tightly to cheese shape.

Tubed Food

Food dispensed in the flexible tube is becoming more accepted and less of a novelty. Tubes are being used by processors for ready-to-use cake icings, sandwich spreads, and cheeses. Made in metal, polyethylene, and saran, the tubes are being marketed in metal by C. H. Musselman Co. for their jellies.



PORTION CONTROL of catsup, mustard and jelly packed in Cellothene.

Bradley Container Corp. is offering plastic tubes of extrusion grade polyethylene to food processors. The tubes may be had in natural color, or in opaque or transparent colors of any shade. Fluid capacities of the tubes range from 4 cc to 16-oz.

Elmer E. Mills Plastics, Inc., is the supplier for the flexible polyethylene tubes used by Sue Ann Food Products Co., Chicago, for ready-to-use icing. The tubes feature a variety of shaped openings, permitting extruding of the icing in decorative strips.

Suppliers Prod Packagers

Spur for another new trend in packaging methods is E. I. Du Pont de Nemours & Co. The Du Pont booth at the exposition featured cellophane food packages designed to meet the requirements of the small household. Based on a survey of the three-unit family, the Du Pont ideas called for packing of portions that would cut waste in these households.

In keeping with this idea, Du Pont unveiled a large baking potato packaged in a polyethylene bag and suitable for two servings. A saddle label allows price and brand data. A combination package of noodles, macaroni, and spaghetti, each separately packaged in printed cellophane bags, was

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Exceptional emulsifying and saponifying powers scientifically balanced with rapid-action wetting agents for thoroughly removing stubborn fat and soil deposits. Ideal for hand cleaning of cookers, vats, fillers, etc. Rinses clean and bright. Tops in its field.

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Highly popular general cleaner especially useful on all wood and metal surfaces, tile, concrete floors, general processing equipment, ovens, hoods, etc. Rapid removal and dispersion of grease and heavy soil. Leaves no scum; rinses freely. Safe for hands.

FLASH-KLENZ

Non-corrosive organic acid detergent for cleaning high temperature equipment. Completely neutralizes and removes baked-on mineral deposits. The latest scientific approach to lime or "stone" dissolution. Eliminates abrasive methods.

KLENZADE XY-12

Concentrated sodium hypochlorite solution for bactericidal use in food plant operations. Rapid and effective for sanitizing all types of equipment. Clear solution, always ready for use. No dissolving or settling necessary. Leaves no sediment or residual film.

SPECIAL DETERGENTS

and equipment for high temperature and heavy duty cleaning. Also fog sanitizing equipment and steam pressure cleaning.

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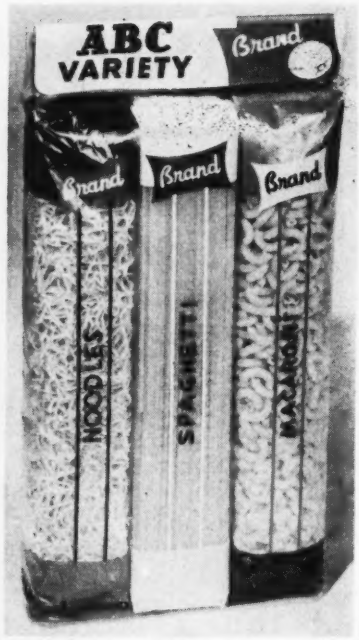
BELOIT, WISCONSIN

CAKE ICING tube has shaped opening for decorating.



MACARONI, noodles, and spaghetti comprise triple pack.

mounted on a backing within a polyethylene bag.

For the frozen food packager was a T-V Dessert package containing individually cartoned ice cream, sliced strawberries, and four shortcakes overwrapped with printed cellophane. Each product is illustrated on the label.

Also prodding packagers was American Can Co., stressing creative packaging. The company called for consideration of possible canning of mayonnaise, catsup, peanut butter, and vinegar, as well as illustrating canning of jellies, and the packing of smoked turkey and tuna slices in sardine cans.

From abroad comes the Eco-Pak, composed of a rectangular paperboard sleeve into which two end pieces are forced by high pressure crimping. Liquidproof when used with a foil or thermoplastic liner, Eco-Pak is made in Germany, and represented by Alfred Hoffman & Co., New York. Airtight, siftproof, and vapor resistant, the carton allows full merchandising application of the surface, while eliminating overwrap need.

Noteworthy was Herb-Slrelly, Inc.'s polyethylene bags permitting "around the bottom" printing. This added feature allows more label surface, as well as a means of combating the shelf display problem. The bag is sealed at the sides, rather than the bottom.

Though not demonstrated in conjunction with food packaging, two items offer possibilities for the food processor. A new plastic screw-cap with a polyethylene cone liner, made by Poly-Seal Corp., New York, eliminates leakage and evaporation. Reported to out-perform conventional disk-type liners, the closure is designed to withstand impact of stress and torque of high speed capping machines. The cap will fit finishes from 15-mm. up, and is available in a wide range of colors.

Though directed at the oil packer, a semi-flexible plastic bottle of cellulose acetate butyrate, is of interest to food plant men, particularly food flavor and color processors. Shatterproof, the bottle is manufactured by Plax Corp., West Hartford, Conn., and was demonstrated with a polyethylene drip-type cap.

For Package Data Use Reader Service, p. 177

New Instant Coffee

Latest entry in the instant coffee field is the Beech-Nut Packing Co., marketing the product in 2- and 4-oz.

glass jars. A blend of several choice coffee varieties, the product is directed at wide consumer acceptance of instant coffee. The jars are labeled attractively in red and white, with the Beech-Nut trademark prominently displayed.

Novel Cheese Containers

A line of Italian cheeses in novel new packages is being marketed by P. Gambardella & Son, New Haven, Conn. Mozzarella cheese is packed in 8-oz. Cry-O-Vac bags, enabling processor to ship for long distances without danger of spoilage. Bag is closed with a metal clip.

Grated cheese, a blend of imported and domestic Romano rather than the usual Parmesan, is contained in 2 and 4-oz. vacuum-packed glass jars. Attractively stenciled with blue, green, and red outdoor scenes, the glasses are reusable.

For Package Data Use Reader Service, p. 177

Special Seasoning Bags

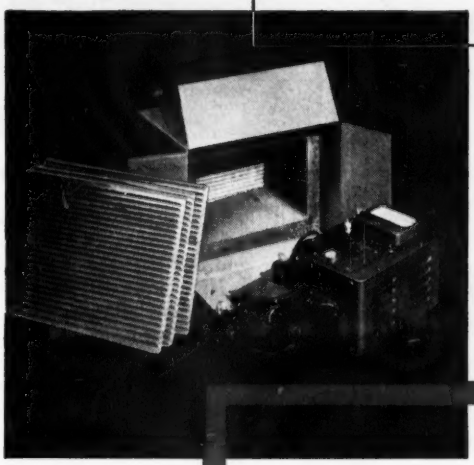
Specially designed polyethylene or white kraft bags with glacine liners have been designed by Dodge & Olcott, Inc. for their new line of dry, soluble seasonings. The solubles are prepackaged in batch lots and shipped in fiber drums.

For Package Data Use Reader Service, p. 177

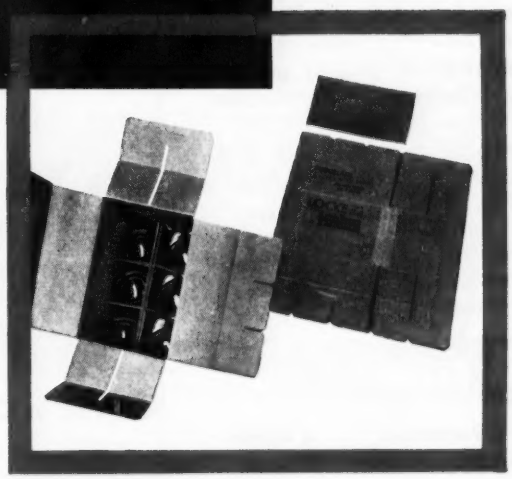
All-Purpose Oil, Shortening

Described by Kraft Foods Co. as "an all purpose oil and liquid shortening", Kraft Oil is being introduced to consumers. Made from refined cottonseed oil, the product is packed in a bottle highlighted by a red, gold, green, and white label with a "zip-out" window that allows the housewife to keep track of the amount of oil left in the bottle. Markings on the label indicate the number of cups of oil remaining.

A screw-on cap has replaced the former vacuum type closure.



SLICE
product
damage



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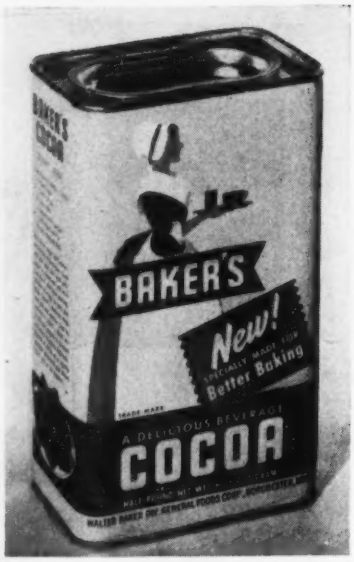
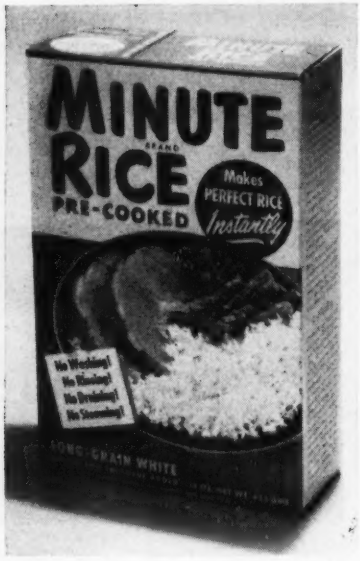




Familiar Products in New Clothes

The familiar Baker's Cocoa package has given way to a bright new brown, yellow, and red package designed to bring the label up-to-date. Replacing the old design on both the 8-oz. and 1-lb. sizes, the new label features recipes on both side panels, while an "outsert" attached to the bottom of the carton offers more recipes.

General Foods Corp.'s Minute Rice has also appeared in a redesigned outfit. The entire front panel has been brightened up, with product name and "pre-cooked" in bold, easy-to-read letters. A bullseye emphasizing the "instant" feature. Full color illustrations of dishes prepared with Minute Rice complete the front panel.

Syrup in Consumer Pack

Butterscotch fudge, milk chocolate fudge, and chocolate flavored ice cream toppings have been introduced to the consumer market by Robert A. Johnston Co., Milwaukee. Packed in cans that vary in weight—8¼-oz. for milk chocolate fudge, 9¾-oz for chocolate, and 9¾-oz. for butterscotch fudge—the syrup can be poured directly from the can and used on ice cream, sponge cake, or puddings. It can also be used as a flavoring for chocolate milk, or milk shakes.

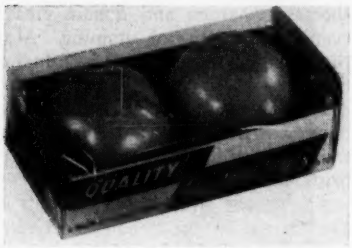
The label contains a picture of each flavor used as sundae topping, and directions and suggestions for the use of the syrup. The product does not have to be refrigerated when opened since storage at room temperature is advised.

Fried-Onion Seasoning

Sautay Onion seasoning is being processed under the Gentry label by Gentry Div., Consolidated Foods Corp., Los Angeles. Made from prime onions, the seasoning contains no salt, filler, or artificial flavoring. It adds a

fried onion flavor to foods with which onions cannot be cooked such as salads or vegetable cocktails.

The new product is packed in full-grip quart glass jars with a fired-on label. A screw cap covers a polyethylene shaker disk.



Twin Tomato Tray

A Tripl-Tite tray designed for "beaut" size 5-6 tomatoes has been developed by Standard Folding Trays Corp., New York. Formerly sold only in bulk, the large tomatoes are packed two to a tray, then overwrapped with cellophane. The tray features a double-reinforced bottom, triple-thick ends, and is printed in red and green to obtain visual impact.

For Package Data Use Reader Service, p. 177

New Product Shorts

Label and Package Changeover

La Choy Food Products, Archbold, Ohio, has converted to all new can sizes, new labels, and dinner cartons. Another innovation is soy sauce no-drip bottles with contrasting red caps.

New Sausage Item

Ashmore Sausage Co., Atlanta, has introduced a new all-meat skinless weiner and bologna sausage to its line.

Frozen Italian Specialty

Italian-style Egg Plant Parmigiana is being processed by Cross Island Food Co., Inc., Astoria, Long Island. Packed in a 16-oz. package, the product contains egg plant, milk, cracker meal, mozzarella, eggs, spices, tomato gravy, cheese, and blended peanut and olive oils.

Drastic Label Revision

Dissatisfied with labeling of their canned onions, Hungerford Packing Co., Inc., has accepted a label designed by H. S. Crocker Co. New label features product illustration and alternating recipes printed on back panel.

New Beef Product

Latest addition to Swift & Co. frozen beef products is a 12-oz. block of chopped beef.

High-Protein White Bread

Designed to provide more protein than the average white loaf, a new loaf is being marketed by S. B. Thomas, Inc., Long Island specialty bakers. The square, 1-lb. loaf is firmer than ordinary white bread.

Pied Tamales

Riviere Packing Co., Oakdale, Calif., has introduced canned tamale pie.

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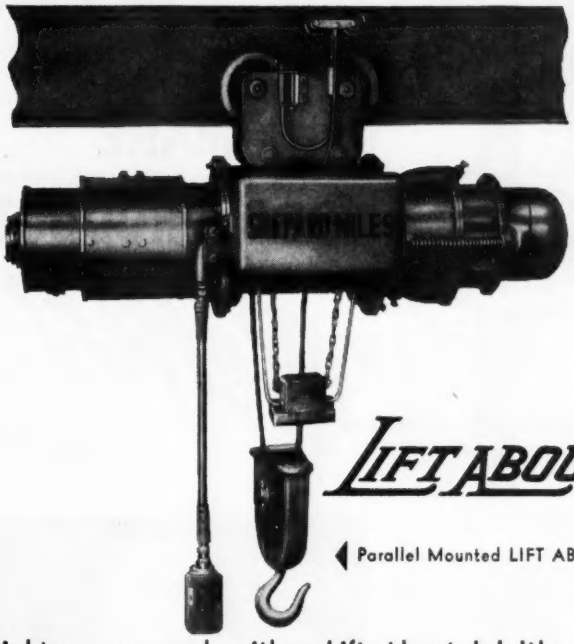

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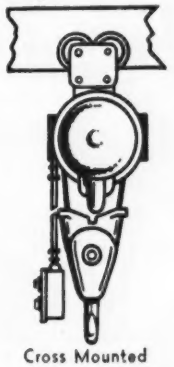

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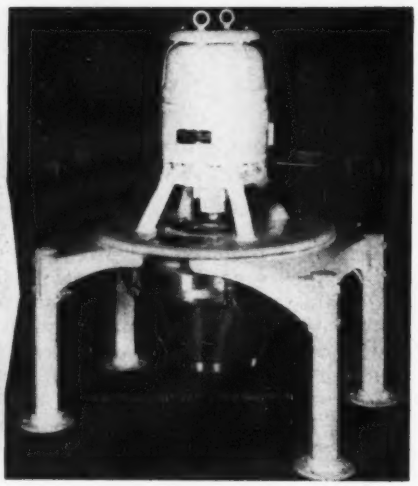

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Sweet Potato Chips

—Continued from page 129

potato slices limp and permeable so that there is a steady flow of water from the chips during frying. Untreated potatoes fry rapidly and the slices case-harden and remain greasy, even after 24 hr. of draining. Also, the chips become curled, hard, and brittle.

Rinsing slices in water before frying removes a large part of the solids and results in thin chips that are very brittle and poor in character.

Pre-heating also transforms most of the starch to sugar and inactivates enzymes responsible for darkening. Also, the slices actually puff up during frying and become porous and crisp. Pre-heated potatoes produce chips that do not break up easily during handling. Yet, the quality is far superior to those made from untreated potatoes.

Preparation Steps

Potatoes were washed, preheated 15 to 20 min. at 170-190 deg. F., and immediately peeled in boiling 20% lye solution. The pre-heating time depends somewhat on the size of potatoes, temperature of storage, and variety. Peeled potatoes should not be soft, yet they should be heated completely through the interior. Effectiveness of pre-heating can be determined by cutting and examining one of the larger potatoes. If the tissue is raw or rigid, then the pre-heating has been insufficient.

Potatoes were cut in a stainless steel slicer. After slicing, the tissue is slightly sticky, due to starch gelatinization.

Thickness ranges between $\frac{1}{32}$ to $\frac{1}{8}$ in. for best quality. Water should not be applied to potatoes after slicing, since it washes away sugars. Sweet potatoes should be prepared and processed in stainless steel equipment for best type chips.

Frying

Cottonseed oil was used as the frying fat. In all instances, an initial temperature of 300 deg. F. and a finishing temperature of 270 F. gave best results. An automatic temperature-controlled, stainless steel fryer was used. Regulating the amount of sliced potatoes to the fryer, to fry the chips approximately 4-5 min., resulted in highest quality.

A good initial stirring to separate the slices was sufficient to prevent sticking during frying. Periodic stirring during frying was necessary to finish a uniform batch. Chips fry to a

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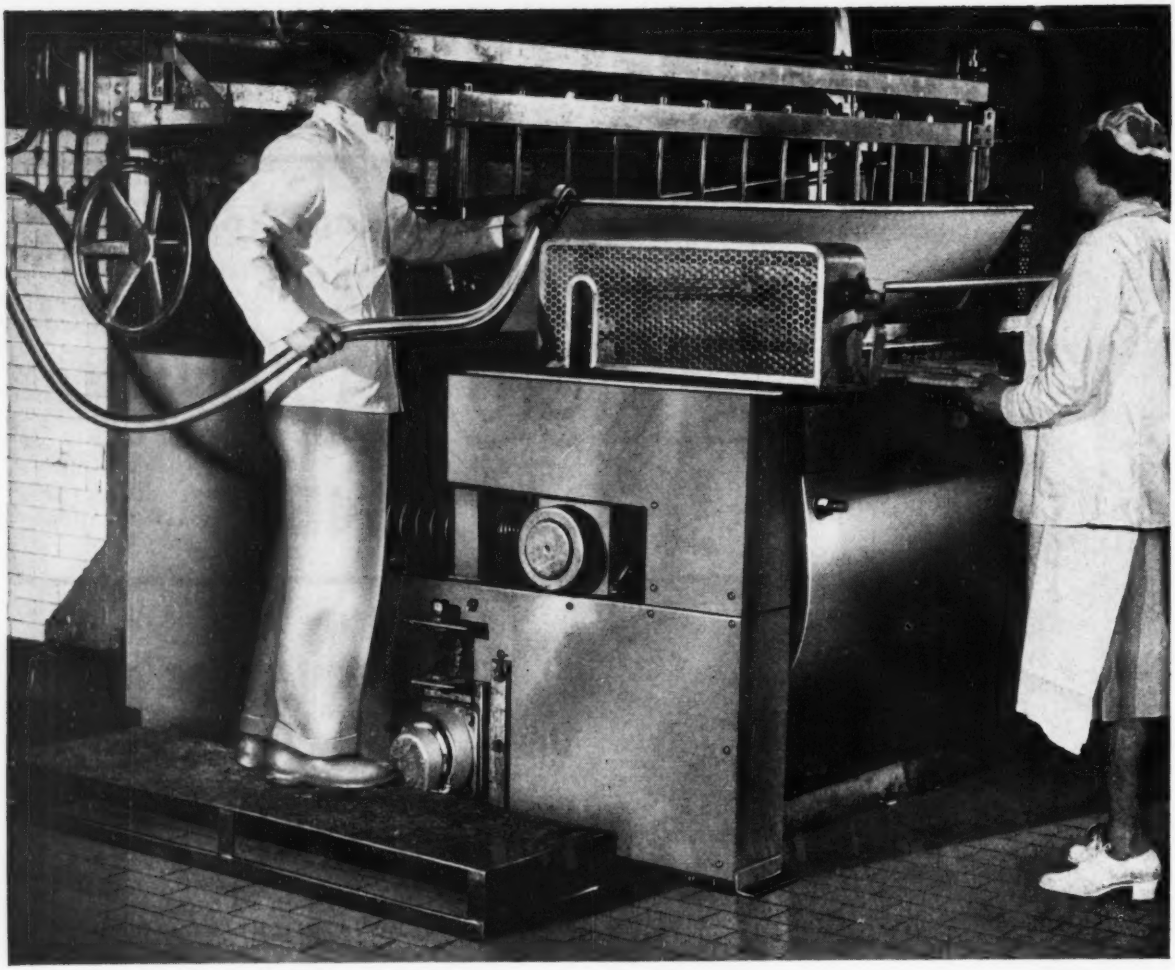

TYGON TUBING Safeguards Purity and Flavor at Horn and Hardart Co.

The world-famous "Automat" is noted for its pies. When you turn out thousands on thousands of pies daily automatic equipment is vitally important. But to Horn and Hardart Co. even more vital and important are the steps they take to safeguard purity and flavor.

Take for example, the operation of filling pie shells. The pie filling (cherry, custard, pineapple — all the many flavors) is fed to the pie shells through crystal clear, 2" diameter B 44-3 TYGON plastic tubing.

Horn and Hardart Co., as do top-quality bakers everywhere, insist on Tygon because they *know* Tygon will neither absorb nor impart flavor, that no harmful ingredient can leach out to contaminate the filling. The plus advantages of Tygon: light weight, flexibility, clearness, easy cleaning, are important, too — but head-and-shoulders above everything else to food processors is Tygon's proven purity — guardian of their product and their reputation.

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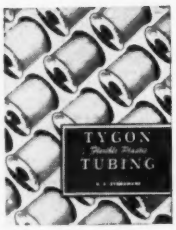

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bright orange or yellow-orange color.

The chips then were drained 30 sec. over the fryer and placed on a tray for further draining. When the chips come out of the fat, they are flabby and tough. But as they air-dry and drain, excess fat on the surface is absorbed and the chips become crisp. After 5 min. of drying, it is best to put the chips in large cardboard containers and allow them to "condition" 24 hr. prior to packaging.

Any of the commercial paper bags suitable for conventional type chips should be satisfactory. These chips have a remarkable storage life, if they are kept in a dry atmosphere. They keep one month without becoming rancid. Waxed paper bags have been used successfully for retaining the crispness and quality of sweet potato chips.

References

1. Brunstatter, B. C., Public Service Patent No. 2,056,884, Washington, D. C., 1936.
1. Dallyn, Stewart L., Unpublished Report, La. Agr. Exp. Sta., 1952.
3. Kimbrough, W. D., and Bell, Marion F., *Internal Breakdown of Sweet Potatoes Due to Exposure to Cold*, La. Agr. Exp. Sta. Bull., 354: 1-9, 1952.
4. Scott, Leland, Appleman, C. O., and Margaret Wilson, *The Discoloration of Sweet Potatoes During Preparation for Processing, and the Oxidase in the Root*, Maryland Agr. Exp. Sta. Bull., A33, 1944.

End (Resume reading on page 131)

Disappearing Bread Boxes

—Continued from page 87

porting, this stack may be tilted at an angle of 45 deg. without shifting or separating. The corrugated liner protects the soft bread from being crushed and wrappers from being broken. Also, it reduces air circulation—the cause of quick cooling and hardening of bread crumb.

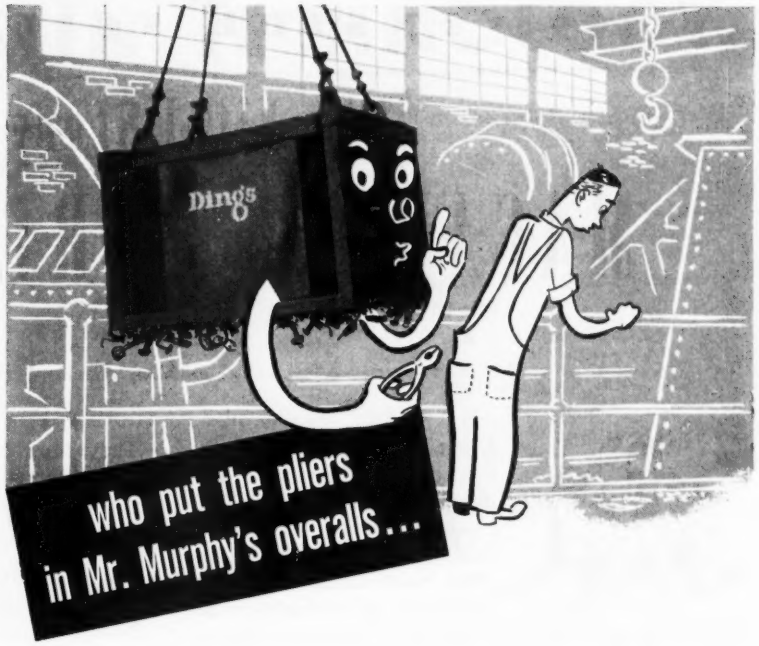
Since there are no nails and no possibility of splinters, risk of injury to hands or torn clothes is therefore eliminated.

Made to Size

Trays are fabricated to each baker's specifications. There are no standardized sizes. One user, Buchan Baking Co., Seattle, currently is employing trays with three different depth dimensions—6½ in., 9 in., and 12 in. The first holds 10 of the 1½-lb. loaves or 15 of the 1-lb. size. The second carries 1-lb. loaves and buns. And the third handles 20 of the 1½-lb. loaves.

Eventually, this bakery will standardize this materials handling operation with the 6½-in. tray.

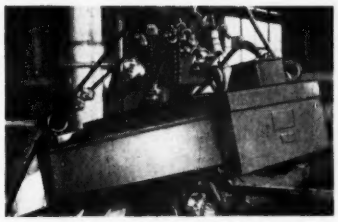
End (Resume reading on page 88)



MURPHY is what we'll call the chief engineer in the Omaha plant of one of the nation's largest grain processors. Here's his story —

One day, not long after his Dings RM Suspended Tramp Iron Magnet was installed, he was wishing he had a pair of long nosed pliers. Shortly after, one of his men walked up and handed him a pair. They'd been pulled out of a 12-inch conveyor belt burden of corncobs by the Dings RM Magnet.

Murphy was awfully glad to see those pliers and not just because he wanted a pair. He was thinking of what they would have done to the hammermills and other processing equipment fed by that conveyor, if they hadn't been caught by the Dings Magnet.



THIS IS THE MAGNET THAT CAUGHT THE PLIERS — That junk on the bottom is a typical tramp iron accumulation — crushed "tin" cans, wire. "Murphy" reports even crowbars occasionally find their way into the corncobs processed in his plant.

You might think about that, too. What's it costing you to "process" tramp iron in your plant? It isn't necessary. Your Dings representative can show you an economical way to eliminate tramp iron with a Dings Magnetic Separator.

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INSIDE SCIENCE

The Vital Story of MACARONI* ENRICHMENT

by Science Writer

This is the fourth article in a series devoted to the story of cereal enrichment

Dramatic results have been recorded about the value of enrichment in improving health. From the United States, the Bataan peninsula in the Philippines, Newfoundland and many other parts of the world comes word of the great benefits which result from enrichment.

For years, some forward-looking manufacturers of macaroni and noodle products have used enrichment to make their good foods better. They know that enrichment restores important vitamin and mineral values which are unavoidably lost in milling, and they recognize their responsibility to provide the greatest health-building benefits for the public.

Enrichment is really a simple process. It adds the following essential elements to the food during manufacture.

Thiamine—also called vitamin B_1. This vitamin helps to build physical and mental health. It is essential for normal appetite, intestinal activity and sound nerves.

Riboflavin—also called vitamin B_2. This vitamin helps to keep body tissues healthy and to maintain proper function of the eyes. It is essential for growth.

Niacin—another "B" vitamin, is needed for healthy body tissues. Its use in the American diet has done much to make a serious disease called pellagra disappear.

Iron—is a mineral used in all enrichment. It is essential for making good, red blood and preventing nutritional anemia.

Products made from semolina may be enriched by two methods. One uses small square wafers which contain all the vitamins and iron necessary to enrich 100 lbs. The wafers break up in a small amount of water which is then added to the paste. For manufacturers who use the continuous press method, a powdered concentrate of the vitamins and iron, called a premix, is available. This is added by a mechanical feeding device.

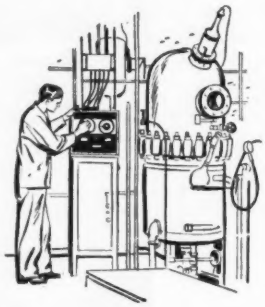
**Macaroni is used here in the generic sense. It includes all alimentary pastes: macaroni, spaghetti, pastina, noodles.*

These are the minimum and maximum levels, in milligrams per pound, required by the Federal Definitions and Standards of Identity for enriched alimentary pastes.

	Min.	*Max.*
Thiamine (vitamin B_1)	4.0	5.0
Riboflavin (vitamin B_2)	1.7	2.2
Niacin	27.0	34.0
Iron	13.0	16.5

NOTE: These levels allow for 30% to 50% losses in kitchen procedures.

Nowadays scientists are able to "build" duplicates of many of Nature's essential complexes in the laboratory. This has happened with many vitamins. First the chemical composition is learned and the pure substance is isolated. Then a "duplicate" is made which is identical chemically and biologically with Nature's product. A vitamin is a vitamin regardless of its source just as salt is salt whether it comes from a mine or is evaporated from the sea. So efficient is large scale manufacturing that vitamins are sold at a lower cost than if they were extracted from natural sources.



The Hoffmann-La Roche people, who produce a good percent of the vitamins used in enrichment, use amazingly complex processes with scientific production controls. This requires modern, special equipment filling whole buildings, each one a city block square and many stories high.

The combination of scientific research, thorough know-how and mammoth manufacturing processes—plus the far-sightedness of leaders in the macaroni industry—is helping vitally to make good macaroni products better.

This article, reprints of which are available without charge, is published as a service to the macaroni industry by the Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 286 St. Paul Street, West, Montreal, Quebec.

ADVANCES IN TECHNOLOGY

Liquid Smokes Contain Phenolic Ingredients That Exert Antioxidant Effects on Fats

Products such as lard and ground pork are protected from rancidity for extended periods by addition of liquid smokes, provided these smokes contain phenolic products. Shelf life is extended still further by a combination of the smoke and ascorbic acid, indicating synergistic characteristics of the liquid smoke.

Four commercial liquid smokes were tested for antioxidant effect on lard by adding sufficient of each to give reasonably strong smoke flavors and odors.

Days to turn lard rancid at 114 F. varied from 8 (for control and smoke sample with no detectable phenol constituents) to 50 with one sample. Addition of ascorbic acid (0.1%) speeded rancidity (to 0.2 days) in control and above mentioned smoke sample, but extended time to more than 90 days with other three smoke samples.

Sample showing greatest antioxidant effect on lard was mixed (0.04%) with fresh ground pork which was then weighed into 50g. patties, packaged in polyethylene freezer bags with an outside waxed cardboard container, frozen and held at 0 F.

Other fresh ground pork samples were packed with BHA (0.01%) and ascorbic acid (0.1%).

At end of 11 months' storage, ground pork sample with liquid smoke had excellent fresh flavor. All others were extremely rancid. Accelerating effect of ascorbic acid alone was very apparent.

Additional pork tests, using 0.02% liquid smoke alone, and in combination with ascorbic acid, showed less protection from this concentration of smoke liquid than with 0.04%, but prolonged protection with the smoke-ascorbic acid combination.

Digest from "Antioxidant Effect of Liquid Smokes," by B. M. Watts and M. Faulkner, *Food Technology*, 158-61, March, 1954.

Impulse Rendering Process Improves Quality of Fat

Separation of fat from animal and vegetable tissues by hot-rendering methods, pressing, or solvent extraction, usually leads to more or less degradation requiring prolonged refining and deodorizing to undo the damage.

Extracted residues are not damaged by the rendering process, except where preservation of their original physical properties is required. This is the case with fresh bone, pork skins, sinews, and similar gelatin and glue stocks, the collagen of which is damaged by heat, desiccation, or chemical action.

All types of tissues carrying oil in cells can be defatted by the impulse rendering process which ruptures the fat cells by high speed impulses transmitted to them by a liquid. In the simplest application a hammer mill supplies the impulses, and water is the liquid used. For some fats salt solution instead of water may be used.

Bone, in 1-2 in. pieces is fed into the renderer along with 6 times its weight of water. One second later bone and fatty effluent are discharged into a separating tank, where the bone, defatted except for surface film, separates by gravity. Washing with hot water completes fat removal. Fat layer is purified by centrifuging, melting, and additional centrifuging. For soft animal tissues the process is similar, the small amount of solids-not-fat being removed by centrifuges. Yield of fat is slightly greater than by dry-rendering, free fatty acid content and moisture are lower, and keeping quality is about 50% better. Fish livers, fish flesh, olives, palm fruits, and coconuts have been defatted by impulse rendering, but vegetable oil seeds remain to be investigated.

Digest from "The Application of Impulse Rendering to the Animal-Fat Industry," by I. H. Chayen and D. R. Ashworth, *Journal of Applied Chemistry*, Vol. 3, No. 12, 529-37, Dec. 1953.

Making of Hard Butter From Coconut Oil

Fractionally distilling hydrogenated coconut oil under high-vacuum, and using only certain fractions thereof, is the basis of a patented process for making hard butter from hydrogenated coconut and similar oils.

The inventor has also discovered that by "topping" the hydrogenated coconut oil to a predetermined extent, a residue that meets the trade requirements of hard butter may be produced.

Moreover, the coconut oil is not decomposed by this operation, and fractions or residues not suitable for hard butter remain as edible glycerides suitable for other food uses.

Process makes it possible to separate hydrogenated or natural oils of the coconut group into numerous products, and so to control the physical properties of the products as to "tailor-make" a glyceride material for a specific use.

Digest from U. S. Patent 2,657,995, issued Nov. 3, 1953, on an application dated Nov. 29, 1949, to John E. Blum, El Cerrito, Calif., assigned to The Glidden Co., Cleveland, Ohio.

MEAT & FISH

Changes In Fish

Freshness of fish is still best determined by sensory tests, no chemical test having proved reliable for the purpose.

Buffering capacity of fish muscle, or the closely related A and B values have been regarded as measures of the degree of bacterial decomposition (A), and proteolysis (B). A value is volume of N/60 acid required to reduce pH of 5g. of muscle to 6.0 from its initial value; B value the corresponding amount of acid required to carry the pH to 4.3.

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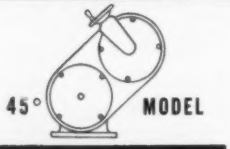
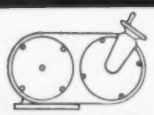
REEVES

Fractional HP Motodrive





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Determination of A and B values on fish from the time of catching to complete spoilage indicated that neither buffer capacity nor trimethylamine oxide content could be satisfactorily correlated with freshness. The pH of fish muscle immediately after death is likely to be close to 7.0. With less glycogen than mammalian muscle, the pH does not drop as low. Carp, for example, had a pH of 7.3 before rigor mortis, 6.4 during, and 6.5 after. There was no further change for about 10 days, though in this time fish becomes fairly stale even when packed in ice. With subsequent development of amines, pH rises to 7.5-8.0 after 20-25 days, by which time the flesh is putrid and inedible.

Digest from "Changes in the pH and Buffering Capacity of Fish During Spoilage," by C. L. Cutting, *Journal of the Science of Food & Agriculture*, 597-603, Dec. 1953.

Chemicals Inhibit Growth Of Molds on Meat

Numerous chemical preservatives have been studied to discover their ability to inhibit growth of molds on meat. Organisms tested included 26 strains of 11 species. The study differentiated between fungicidal and fungistatic activity, the latter being considered more important in preventing meat spoilage following growth and sporulation of molds. Czapek's solution was used as a standard basal medium, but parallel tests were made with a glutamic acid medium. The pH of media was 4.5 and 6.0, respectively.

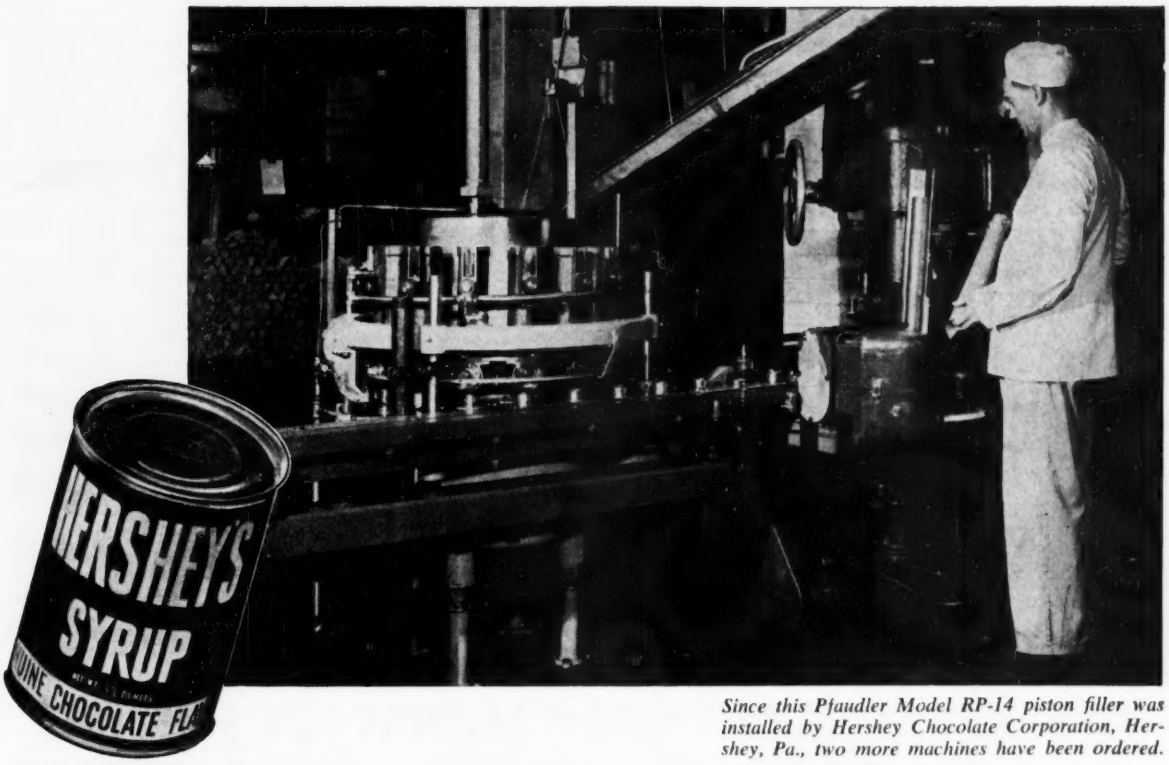
Fungistatic tests were made with salt, sodium nitrate, and sodium nitrite. The last was the only one to show appreciable fungistatic activity, but its toxicity to man rules out the possibility of using it in necessary concentrations.

Acetic and propionic acids, sodium acetate and diacetate showed varying degrees of toxicity to the test fungi. Poorest was sodium acetate.

Propionic acid, although highly toxic to fungi, might be objectionable on account of taste and color. Propionates were not specially effective. Sodium benzoate and boric acid were regarded as useless for the purpose. Crotonic acid, however, was effective in low concentrations.

Two of the most promising chemicals investigated were trichlorophenyl acetate and G-4. The former inhibited growth of almost all of test organisms and showed low toxicity to animals.

G-4 widely used for proofing fabrics against mildew—was more effective in glutamic acid medium than in Czapek's solution. Other chemicals showing fungistatic properties were sorbic acid, hexamethylenetetramine,



Since this Pfaudler Model RP-14 piston filler was installed by Hershey Chocolate Corporation, Hershey, Pa., two more machines have been ordered.

Why Hershey Chocolate Corporation added more Pfaudler fillers to production line

Any product with the popularity of Hershey Chocolate syrup must be handled speedily to keep up with demand. There is no more sensitive spot on the production line than the filling operation. Failure here could really mean trouble.

Recently, Hershey installed a Pfaudler Model RP-14 piston filler with a capacity of 300 five-ounce cans per minute. Performance has been so smooth, so accurate that two more Pfaudler machines are being added to the line.

This experience parallels that of many other famous food companies – Gerber Food Products, Armour, Minute Maid, Beechnut Packing, A. & P., Birds Eye, and H. J. Heinz to name a few.

Control on these fillers is so precise that even at high speeds, filling is accurate to ±1/10 of an ounce on most products. Adjustments can be made while machine is operating. There is no slop-over or waste.

No dismantling tools required

Pfaudler fillers are extremely sanitary in design from top to bottom. For example, piston and valves can be disassembled without tools in a few minutes. No piston rings are used. Every part can be cleaned quickly and inspected visually.

Every Pfaudler filler is synchronized with the seamer to eliminate spillage and to prevent damage to containers at high speed.

These and other exclusive features have made Pfaudler piston fillers top choice with the top producers in the food industry. Don't you owe it to yourself to check the facts? The coupon is for your convenience.

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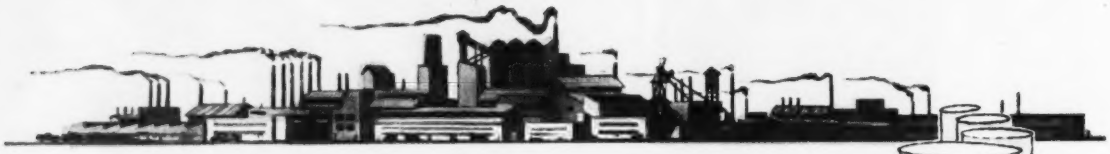
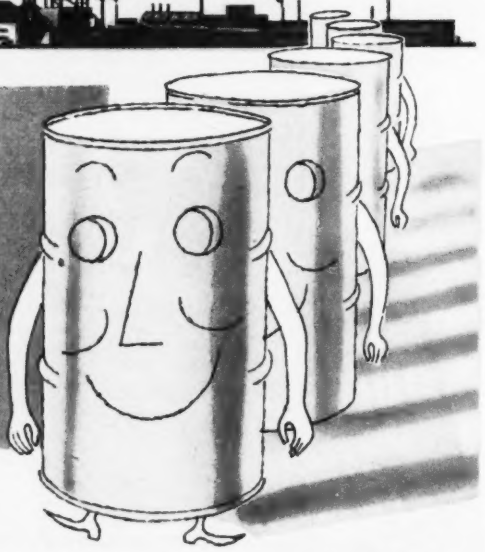


Rheem Drums are built of Cleaner Steel for Longer Life!



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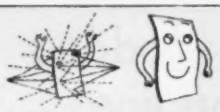
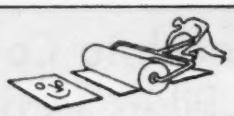


Shot-blasting process removes troublesome oxide scale from both sides of the steel sheet and leaves a clean, oxide-free surface.

2



The sheet is rolled and leveled to insure a smooth even surface necessary for precision roller coating.

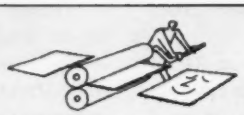
3

Detergents, scalding water and revolving brushes scrub each sheet clean, followed by rinsing and drying.

4

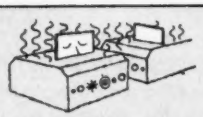
The sheet is treated on both sides with a special patented phosphoric compound to inhibit rusting, enabling Rheem Drums to withstand long periods of weathering.

5



Special coatings, where required, are roller-coated under precision control that eliminates rust-producing thin spots.

6



Coatings are baked-on to produce a tough, durable finish that protects your product from contamination.

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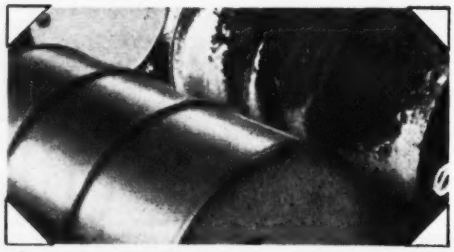

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Digest from "Inhibition of Moulds on Meat," a review of series of reports by F. A. Wolf, Duke University, *FOOD Processing, Packaging, Marketing,* (London) 57-58, 61. Feb. 1954.

BAKING

Wafer Sandwich Oven

Design of an oven for baking wafer sandwiches in a continuous strip is the subject of a recently patented invention.

Oven comprises two hollow rotary drums spaced slightly apart and at different levels, around portions of which runs an endless metal sheet. This band also travels around two terminal rollers, one to each drum, and an intermediate roller in the angle between them.

Drums are heated internally by gas burners. Other burners play on the enveloping metal sheet. Oven is formed in space between each drum and the metal band.

In operation, batter is fed into the space between the drums and enveloping band. Baked wafer sheet from lower drum issues horizontally on a roller track and receives a coating of filling just before upper wafer sheet comes into position to form the sandwich. Endless sheet is then cut into appropriate size.

Digest from U. S. Patent 2,660,961, issued Dec. 1, 1953, on an application dated Jan. 24, 1949, to Theodoor R. Neutelings and Willem Neutelings, Bergen op Zoom, Netherlands, assigned to Industrie- en Handelmaatschappij "De Vuurslag" C. V. Roosendaal, Netherlands.

Ice Cream Methods Used For Frozen Cake Mix

A method of producing a frozen cake mixture said to possess all the quality of fresh home-made cake, and employing ice cream making techniques and equipment has been patented in England.

Process comprises mixing and whipping, in presence of air or an inert gas such as CO_2, basic cake ingredients exclusive of flour, freezing the emulsified mixture, then blending chilled flour to produce completed frozen mixture.

In preparing the ingredient emulsion, ice cream making steps—pasteurization, homogenization, cooling and aging—may be used. Freezing may be accomplished in a conventional continuous ice cream freezer such as the Vogt in which desired overrun is obtained through incorporation of air of gas. Flour, chilled to 10 F. is mixed with the entering air and incorporated in the frozen sugar, egg, fat emulsion.

Process enables all constituents to

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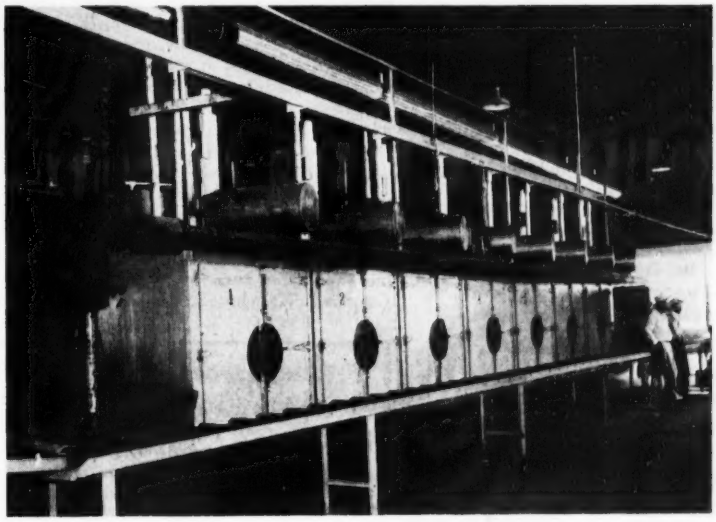

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be blended and emulsified to produce an almost perfect colloidal suspension with desired overrun. Frozen product has good keeping qualities due to the fact that hydration of the flour is avoided, and full aeration is retained. Mixture may be placed directly in oven on removal from frozen storage.

Digest from British patent application 15,607/53, dated June 5, 1953, assigned to G. K. Menon, President, The Pankies Co., London.

CONFECTIONERY

Coarse-Flavored Cacao Beans Helped by Special Process

By application of the "Kapag" process of Taubert, Akkra cacao beans can be modified so that suitable blending will yield chocolates with fine flavors.

In the process, purine bases are activated or reduced in quantity, and anthrocyans and other tannins are reduced by hydrolysis, while the empyreumatic notes are increased by high roasting temperatures.

As a basis for the blending, cacao flavors are analyzed into 9 flavorlines, from sharp acid-bitter with a burnt tone, through a mildly acrid-bitter with "milky tone" (line 5) to mildly bitter with coffee-like tone (line 9).

Chemical analyses are given to show composition of beans with different flavor qualities. Taste analyses of fine cacao beans, Summer Arriba, fine Estates Grenada, Java, and Venezuela natural Carenero, are also shown.

Basic flavor of cacao is due to the sharp taste of anthocyans and the bitter taste of the more soluble purines, rounded out by fat-soluble aromatics.

Digest from "Experimental Cacao Taste Investigation and Cacao Improvement," by A. Taubert and A. Bäucker, *International Chocolate Review,* No. 12, 330-38, 1953, and No. 1, 6-9, 1954.

Coating Food Products

An improved method of applying coatings to chewing gum, candy, nuts, and other products is the object of a recent patent.

Crux of the invention is supporting products in a turbulent air stream during coating and drying in a specially designed chamber to insure uniformity of the coating.

Process comprises admitting uncoated products to a sloping screen within the chamber where they are picked up by air and tumbled just above the screen. At the same time, products are exposed to other air streams containing powdered coating materials. As they become coated, specific gravity of the products in-

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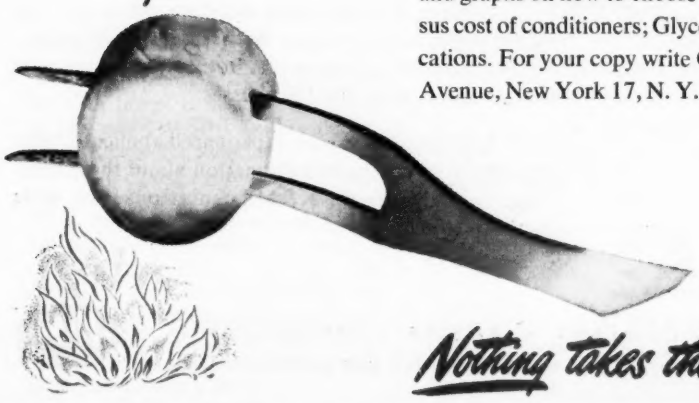
For over 30 years, "Fireside Kreamy Whip Marshmallows" have contained U. S. P. Glycerine. The Fireside Marshmallow Co. of Chicago uses Glycerine primarily because it preserves tenderness in cast marshmallows—keeps them fresh by retaining moisture.

A conditioning agent used for foods, chewing gum, dentifrices, and pharmaceuticals must be desirable in taste. It also must *not* interfere with or distort other flavor elements. U. S. P. Glycerine fully meets these requirements.

In candies and confections . . . in flavoring preparations . . . in casings for meat and cheese . . . in dozens of other food applications—Glycerine's unique range of properties and freedom from toxicity make it an outstanding favorite.

NEW FREE BOOKLET ON PRODUCT CONDITIONING contains text, tables, and graphs on how to choose a product-conditioning agent; performance versus cost of conditioners; Glycerine properties, derivatives, grades, and specifications. For your copy write Glycerine Producers' Association, 295 Madison Avenue, New York 17, N. Y.



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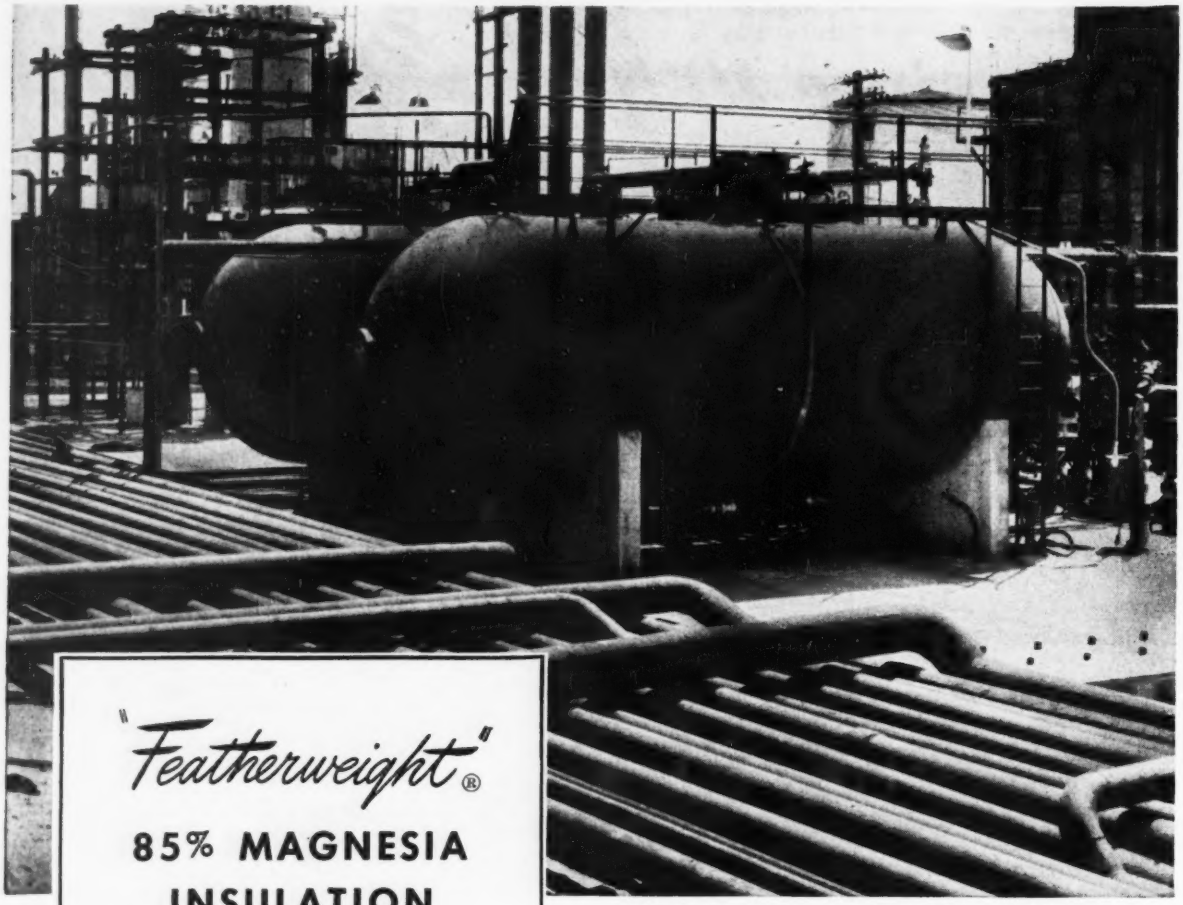

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For any industrial insulation use, "Featherweight" proves to be a thrifty choice. By itself this material (85% basic carbonate of magnesia and asbestos fiber) has an effective insulating range up to 600°F. Used with K&M Hy-Temp Insulation, its range is extended to 1900°F.

Hy-Temp is applied directly to the hot surface, and "Featherweight" is used as the second layer. The two materials, when applied with staggered vertical and horizontal joints, eliminate heat loss which occurs on single layer installations when the expansion of hot piping and equipment causes joints to open.

These K&M insulations will last the life of the equipment they serve, will withstand moisture, vibration, and frequent temperature change. With a waterproof jacket, they serve equally well outdoors. Both materials are supplied in various sizes and thicknesses.

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creases until the upwardly flowing air stream is insufficient to support them. They roll down the screen to an exit slide and are discharged to a polishing pan or other receptacle.

Digest from U. S. Patent 2,648,609, issued Aug. 11, 1953, on an application dated Jan. 21, 1949, to D. E. Wursteer, assigned to Wisconsin Research Foundation, Madison.

DEHYDRATION

Dried Legume Soup Base Needs No Cooking

A method of preparing dried bean and pea soup products that are easily reconstituted to the consistency and characteristics of fresh soups by merely adding hot water, is revealed in recent patent specifications.

The precooked legumes are not in powdered form, yet they are rehydratable in water at normal temperatures. For example, a batch of commercially dried beans is washed in water at 70 F., then soaked in water at that temperature to full absorption —approximately 50-55%—for 12-16 hr. Soaked beans are then blanched in boiling water for about 6 min. to remove bitter flavors. This is followed by steam-pressure cooking in a retort at 245 F. for 20 min.

Cooked beans are put through a hammer mill fitted with a ⅛ in. screen, with hammers rotating at 3500-4500 rpm. A stream of air at 50-100 lb. pressure is directed at screen to facilitate passage of particles. Comminuted product is spread on trays and dehydrated to 1.5-5% moisture content.

Starch in the product is believed to be completely gelatinized, and cells separated to produce air spaces. Rehydration time of bean and pea soup bases ranges from 1-1½ min. in 160-180 F. water.

Digest from U. S. Patent 2,657,999, issued Nov. 3, 1953, on an application dated March 6, 1950, to Albert C. Rauch, Blue Island, Ill.

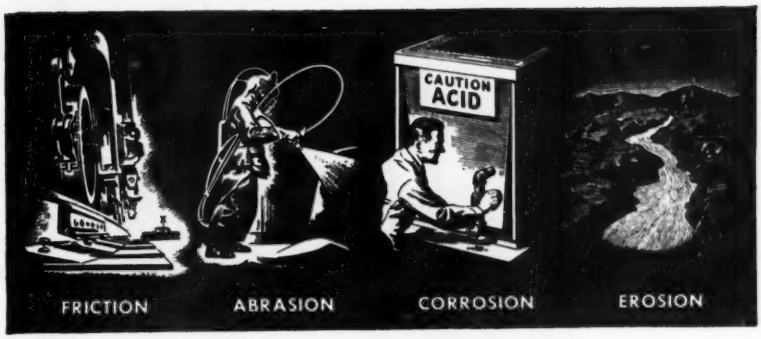
DAIRY

Slimy Cottage Cheese

Keeping quality tests for determining shelf life of cottage cheese should be performed at 70 F. rather than at plant storage temperature.

For, at 70 deg., slime develops rapidly in contaminated cheese, while at 40 F. the same contamination does not produce slime until 1-2 weeks.

These are findings of a study conducted to determine relationship between storage temperature and production of slime defects in cottage cheese, and resistance of slime-forming organisms to heat and Cl.



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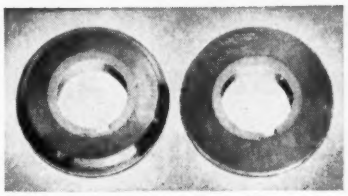
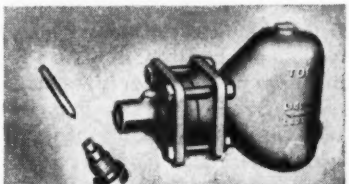
with Carboloy® cemented carbides



Dies for the extrusion or pill pressing of highly abrasive ceramics, pharmaceuticals or powdered metals, equipped with Carboloy cemented carbide, remained on the job many times longer than any other material.

In one plant, steel spray nozzles for homogenizing and dehydrating food products lasted 100 hours, due to the corrosive-abrasive action of the food products. Then Carboloy cemented carbide nozzles were used, and nozzle life increased to 3000 hours.



Steel valve stems and seats in a refrigerator regulating valve were quickly corroded and worn by ammonia. To resist this, inserts of Carboloy cemented carbide were substituted. Valve life increased 5 to 6 times.

WHERE ACIDS, alkalis, heat, oxidation and the like reduce equipment life, you can slow down wear, reduce maintenance costs, increase production and improve product quality with Carboloy cemented carbides.

The Carboloy organization manufactures cemented carbides in standard stock items, or designs them to your specifications for spray nozzles, steam valves and orifices for processing foods, soaps and drugs. Plus countless other applications such as core pins for ceramic baking where friction, corrosion, erosion and abrasion must be resisted.

Ask your equipment manufacturer, or write us, about strategic parts made wear-resistant through use of Carboloy cemented carbides.

Put These Outstanding Characteristics To Work In *Your* Plant:

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- High corrosion resistance
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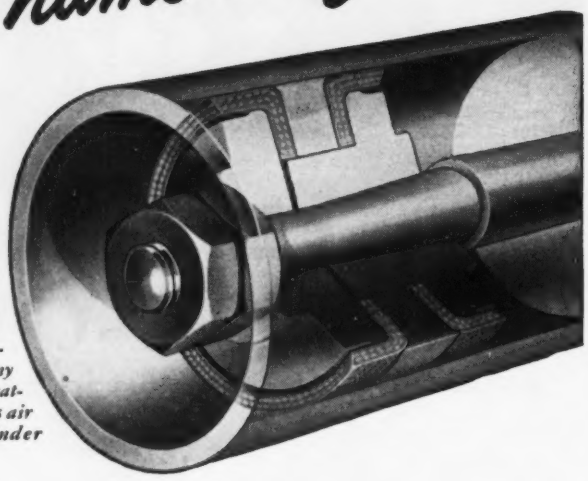
DEPARTMENT OF GENERAL ELECTRIC COMPANY
11167 E. 8 Mile Blvd., Detroit 32, Michigan

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

SETTING THE PACE FOR INDUSTRIAL PROGRESS

For more information, use coupon on page 177.

You name the fluid...



Phantom cutaway showing typical Pumcup-piston assembly—one of many types for all reciprocating pumps as well as air or hydraulic cylinder mechanisms.

Here's how to pump it at lower cost!

IN thousands of plants, Darcova Pumcups are solving the problem of diminishing pump efficiency, repacking, maintenance, down-time, lost production—the things that really eat up dollars in fluid-handling operations!
Here's why . . .

1. Darcova composition Pumcups not only increase volumetric efficiency, but they *keep* it high with no appreciable fluid slippage for the entire life of the Pumcups.

2. And, because of their design, composition, and operating principle, Pumcups have *many times the life* of most other types of piston packing.

3. Based on years of application research, Pumcups come in standard and special compositions for exceptional stability in handling almost *any* fluid you can name. For example . . . strong acids and alkalies, food products and even the most troublesome petroleum derivatives.

Big savings? We'll gladly refer you to Pumcup users whose problems are similar to yours. *They'll* tell you! Meanwhile, send for a free bulletin containing helpful, more detailed information: Bulletin 4401 on Pumcups for reciprocating pumps; Bulletin 4502 on Pumcups for air and hydraulic mechanisms. Just write to . . .

DARLING VALVE & MANUFACTURING CO.
WILLIAMSPORT 20, PA.

DARCOVA
THE ORIGINAL COMPOSITION CUP
PUMCUPS

Rate of slime formation on inoculated cheese stored at 40 F. was 7-14 days; at 50 F., 5-14 days, at 70 F., 1-4 days.

Slime-forming cultures were destroyed in 2½-min., at 145 F. Seven survived 1-min. exposure to 5 ppm. Cl; 3, 25 ppm., 2, 50 ppm. The latter 2 survived 25 but not 45 sec. at 100 ppm.

This indicates that proper chlorination of water prior to its use for washing cheese, then storage at 40-50 F. should go a long way toward controlling sliminess.

Digest from "Slime Formation on Cottage Cheese," by P. A. Davis and F. J Babel, *Journal of Dairy Science*, 176-83, Feb. 1954.

Detecting Foreign Fats

A method for detecting adulteration of butterfat with vegetable or animal fats, claimed to be accurate for as little as 10% foreign fat, has been developed. It is based on differences in solubilities of triglycerides in absolute ethanol and in their esterification rates.

Suspected sample is first separated into alcohol soluble and insoluble triglycerides in order to increase concentration of adulteration in one fraction. Refractive indices of the two fractions are then determined and compared with those of pure butterfat.

Admixtures of butterfat and 10% of the various fats commercially available as substitutes had different solubilities in ethanol, different refractive indices, and different rates of ethanolysis from pure butterfat. For example, addition of 10% coconut oil increased quantity of alcohol soluble triglycerides and an alcohol soluble and ethyl ester fraction of lowered refractive index than pure butterfat.

Most of the other substitute fats yielded less alcohol soluble triglycerides and an alcohol insoluble fraction of higher refractive index than butterfat.

Digest from "A Method for the Detection of Foreign Fats in Dairy Products," by V. R. Bhalerao and F. A. Kummerow (Dept. of Food Technology, University of Ill.), *Journal of Dairy Science*, 156-61, Feb. 1954.

MISCELLANEOUS

Liquid Displacement Device Insures Uniform Can Fill

Improvement in displacement apparatus for filling valves, as used in the canning industry, is object of a recent patent.

Displacement device is a bellows of flexible material disposed above the container and adapted to expand into it when water is injected. Valve ar-

How many man-hours can the MORTON BRINEMAKER save in your plant?

Just figure the costly man-hours spent hauling salt to all the areas in your plant where it is needed.

Those are the man-hours the Morton Brinemaker can save you, if your canning operation is adaptable to brine salting. And we believe you will find them considerable!

Brine at the turn of a tap

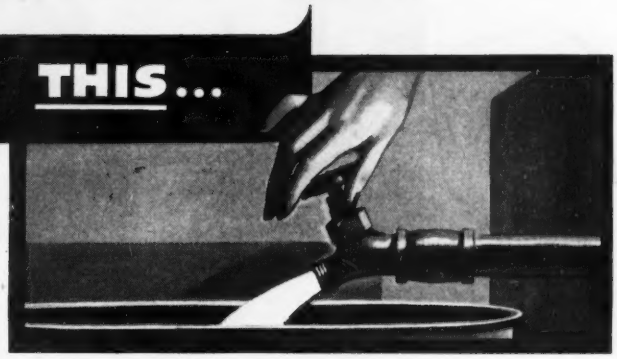
The Morton Brinemaker delivers clear, fully saturated brine that can be pumped from a convenient ground floor location anywhere in your plant. Brine is always available where and when you want it, in the most convenient way possible!

Up to 800 gallons an hour

Using the type of salt that is most economical and best suited for your needs, the Morton Brinemaker can deliver up to 800 gallons of saturated high-purity brine an hour. As much or as little as you need is always on tap. Models designed for Morton high-purity evaporated salts rarely need be shut down for cleaning.

How about your plant?

In many types of canning, the Morton Brinemaker can save real money as well as provide the most convenient salting operation of all. How about *your* operation? Mail the coupon below *today* for full information!



Brine on tap
anywhere in your plant

Wasted man-hours
hauling salt where needed

MAIL TODAY !

MORTON SALT COMPANY
Industrial Division
120 S. LaSalle St., Dept. ET-5,
Chicago 3, Illinois

Please send me full details on the Morton Brinemaker. I would also like information on:

☐ Morton Canning Salt ☐ The Bulk Salter ☐ The Salt Tablet Depositor

Name and title_____

Firm_____

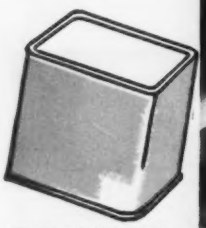
Address_____

City_____ Zone_____ State_____

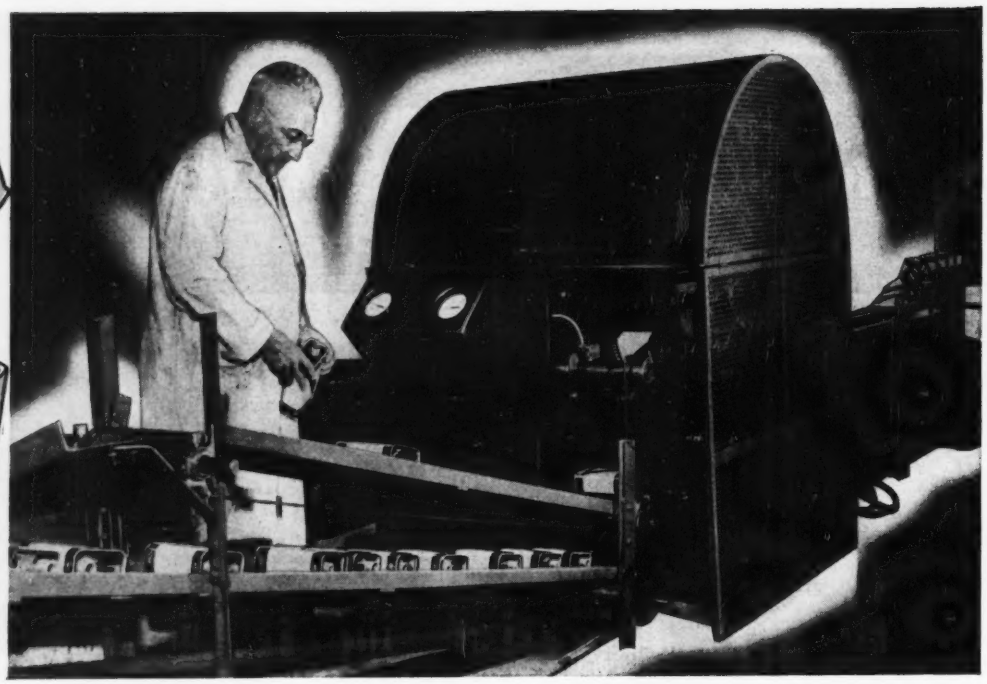
(Brinemaker not available on West Coast)

For more information, use coupon on page 177.

TESTS ROUND CANS FROM 2" to 4½" dia.



TESTS SQUARE AND RECTANGULAR CANS FROM 2⅜" to 4¼" ACROSS CORNERS *(can be modified for larger sizes)*



The BLISS 318-- Here's a practical can tester for medium speed production lines

The 18 testing heads of the Bliss 318 handle F-style cans in half-pint, pint and quart sizes at up to a 150-per-minute rate . . . square and rectangular cans up to 100 per minute, including those with handles and spouts.

SIMPLE, FOOLPROOF TEST—As cans feed into the Bliss 318, they're enclosed by one of the 18 air-tight testing buckets. Compressed air is then pumped to the can. Even the slightest pinhole leak in the can will cause air pressure in the bucket to rise. When that happens the can is ejected automatically. It's a simple, thoroughly-dependable way to eliminate "leakers".

COMPLETELY AUTOMATIC—The Bliss 318 Automatic Air Can Tester needs no operator. An electrically-controlled stop-and-start feeding system completely eliminates jams—*automatically*. All cans are tested and passed or rejected—*automatically*. And the simple, rugged construction of the 318 means trouble-free performance, a minimum of maintenance.

COMPACT—Easy to install in your production line, the Bliss 318 only requires a floor space of approximately 5 x 6 feet.

MODERATELY PRICED—The Bliss 318 Can Tester gives you the advantages of many larger testers—at a lower cost! Can you use a Bliss 318 on your line? It's easy to find out. Call in a Bliss Can Machinery Specialist to study your production line set-up and make his recommendations. There's no obligation on your part, of course.

E. W. BLISS COMPANY
50 Church Street, New York 7

BLISS on your machine is more than a name...*it's a guarantee*

BLISS CAN AND CONTAINER MAKING MACHINERY

SLITTERS

BODYMAKERS

FLANGERS

SEAMERS

TESTERS

STRIP FEED PRESSES

***Food Engineering* Reports**
LATEST TECHNICAL NEWS
In Keeping Up With Field . . . . page 207

rangements are such that as soon as liquid begins to flow into the container, a predetermined charge of water flows into the bellows. Inasmuch as both were previously under vacuum, they fill promptly without formation of air pockets. The bellows distends to a predetermined size within the container and displaces the desired volume of liquids.

If the container has been filled with solid matter, such as fruit, the flexible bellows expands over the irregular surface and accomplishes the displacement without damage to the product. On completion of filling operation, bellows collapses under vacuum and retracts into original position. The cycle is repeated with a fresh charge of water for next can.

Digest from U. S. Patent 2,656,963, issued Oct. 27, 1953, on an application dated Sept. 16, 1947, to F. W. Krueger, San Jose, Calif., assigned to Food Machinery & Chemical Corp., San Jose, Calif.

Interaction of SO_2 With Fruit Sugars

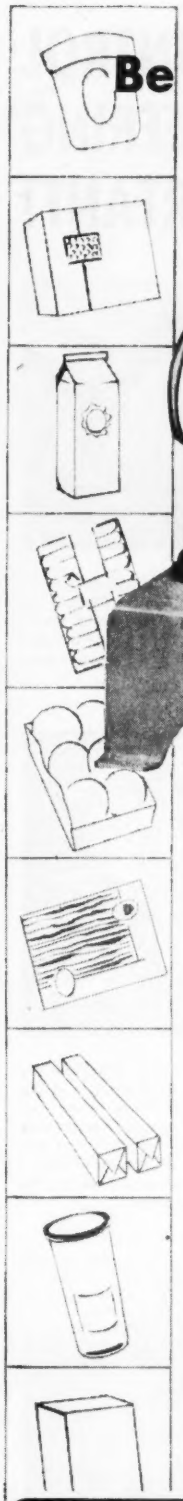
That sugars in dried fruits, fruits juices and juice concentrates have the power to bind SO_2 so that it is no longer titratable with iodine is the usual explanation for the apparent or partial disappearance of sulphites from such products.

Such foods contain practically no true aldehydes, and combination with the aldehydic group of glucose is presumed since sucrose solutions do not absorb SO_2. At pH 5, glucose solutions (10%) reach equilibrium with sulphite in 30-40 min., while at pH 2.2 about 100 hr. is required.

Absorption of SO_2 is much greater in high solids solutions. A solution of 20% glucose in water binds only about 80% as much sulphite as a 20% glucose, 60% sucrose solution.

Compound resulting from reaction of glucose and sulphites is an open-chain glucose sulphonate whose sodium salt contains 106% S. It can be prepared from concentrated glucose and sodium bisulphite solutions and occurs as fine colorless needles. Fructose does not combine with sulphites probably because none of the open chain isomer is normally present, but arabinose forms a sodium arabinose sulphonate similar to the sulphonate of glucose.

Digest from "The Mechanism of the Interaction of Sulphur Dioxide With Certain Sugars," by J. B. S. Braverman, *Journal of the Science of Food & Agriculture*, 540-47, Nov. 1953.



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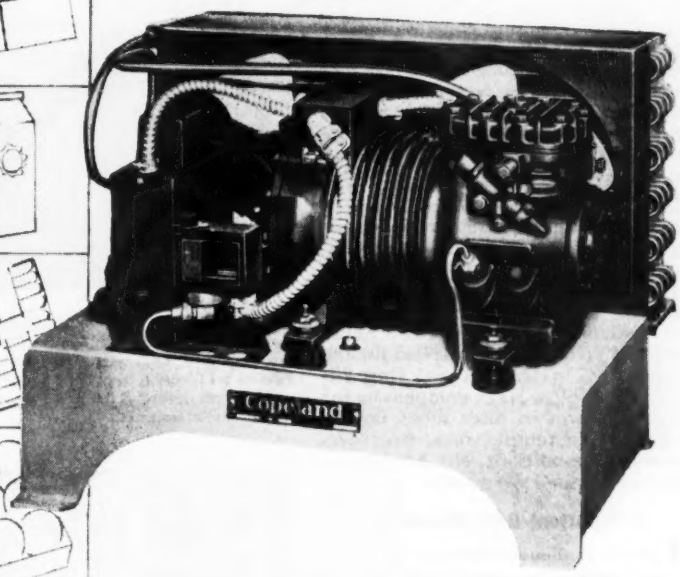
Proved Protection



COPELAMETIC

THE *Accessible* HERMETIC

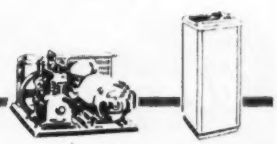
For pre-cooling, freezing or storage, many large processors depend on practical COPELAMETIC refrigeration units. In an industry where low-cost operation and continuous unfailing performance are vital, COPELAMETIC has earned top recognition.

Copeland's design leadership has drastically reduced maintenance, by eliminating all belts, seals, and manual oiling from COPELAMETIC. And Copeland *added* accessibility! Should the rare need arise, the unit can be serviced instantly, on the spot. No unnecessary shutdowns, no sending back to the factory.

COPELAMETIC runs, quietly, economically . . . gives consistent high BTU for minimum cost. There are self-contained and remote units for every application.

WRITE FOR BULLETIN C-54

Copeland
DEPENDABLE *Electric* REFRIGERATION



COPELAND REFRIGERATION CORPORATION • SIDNEY, OHIO

Better DUST CONTROL ENGINEERING IS IMPORTANT!

DAY *engineered* dust control includes plant survey, system layout, strategic location of equipment and efficient installation. These factors and many more are included in DAY'S *engineered* dust control to assure you the utmost in effectiveness and over-all economy.

DAY *engineered* dust control is backed by a program of constant research for greater equipment and system efficiency. For example, DAY engineers achieved an important advancement in dust filter efficiency with the development of DAY'S patented SELF-ADJUSTING BLOW RINGS for the DAY "AC" (Hersey Type) Dust Filter. These blow rings compensate for any variation in filter tubes due to changes in temperature, pressure, moisture conditions, etc. *They assure perfect cleaning air contact.*

Photo shows two of eight DAY "AC" Dust Filters used by Chas. Pfizer & Co., Inc. The filters shown are located at the Groton, Conn. plant. DAY'S Reverse Jet Cleaning permits the use of a better grade of pressed wool felt which captures even submicron dust particles.

5 Important DAY Advantages

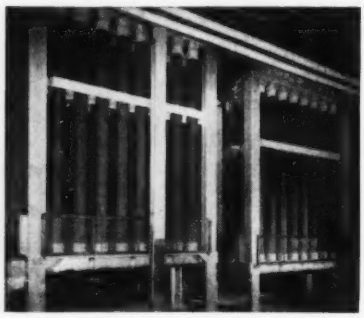
1 DAY'S continuous Reverse Jet Cleaning permits the use of more efficient filter media which gives filtering efficiencies up to 99.99+%.

2 Constant air volumes are maintained.

3 Continuous, automatic operation without the necessity of shutting down any section for cleaning.

4 Air-to-cloth ratios to as high as 20 to 1.

5 Self-Adjusting Blow Rings assure perfect reverse air to cloth contact.



Two of the eleven DAY "AC" Dust Filters used by Pillsbury Mills, Inc. The filters shown are in the cake mix plant at Hamilton, Ohio. Space and headroom were at a premium in this modern, one story plant and the dust control equipment was placed to consume a minimum amount of space. Leading millers and food processors recommend DAY for dust control engineering.

Write For New Bulletin

If you have a dust control problem, whether it involves a complete system or a single unit, your inquiry is invited. WRITE FOR BULLETIN 528-R.

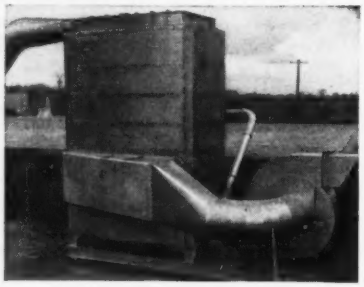
The DAY Company

817 Third Ave. N. E., Minneapolis 13, Minn.

IN CANADA: P. O. Box 70D, Ft. William, Ontario
Branch Plants: Buffalo, Fort Worth, Welland, Ontario

Representatives In Principal Cities

DAY SINCE 1881
DUST CONTROL
A SINGLE UNIT OR A COMPLETE SYSTEM



DAY "AC" Dust Filter installation, Lapp Insulator Company, LeRoy, New York. The company reports—"most of our dust is very fine and varies in size from 1 micron to 25 microns. The DAY Dust Filter solved our dust problem". DAY "AC" Filters consistently provide filtering efficiencies up to 99.99+%.

Dewaters Pectin Gels

—*Continued from page 69*

Initial drainage rate of the gel was fairly rapid. During this stage, the barrel was rotated at a very slow rate, or was allowed to stand with no more than an occasional turning through a fraction of a rotation. When the gel had "bodied" enough so that the working provided by the loose cloth and lifters was needed to encourage further dewatering, the barrel was rotated continuously at a higher rate until the drainage rate became very low.

The water-washing pipe was then placed in position, and a slow stream of water was played on the gel at the point of greatest bed depth. Wash water was added at a predetermined rate to control the consistency of the gel during washing. Considerably less water was required to accomplish the same degree of washing in the reel as was required in washing by repeated batchwise soakings and drainings of the gel.

Washing was continued until pH of drainage water was increased to about 1.8. Reeling was continued without further washing until the drainage rate again became very low.

The batch was then removed from the reel at a solids content of about 8%—a level at which the gel was readily handled in a rack-and-frame press. In some cases, the gel was washed initially with dilute acid, then with water, with the same equipment and technique.

When thoroughly cleaned and rinsed after each use, the cotton cloth in the reel held up 2 yr., despite extremely acidic conditions. Cloths of staple or synthetic filament fibers should be satisfactory, and would probably require less care than cotton.

End (*Resume reading on page 70*)

Fringe Benefits

—*Continued from page 89*

ducements, in the form of fringes, to hold their employees and to aid in the recruiting of new workers. Unions made capital of the situation to amass as many and valuable supplements for their members as possible.

To union officials it must be a source of satisfaction to leave the bargaining table with fringe-benefit scalps dangling from their belts. Wages have gone up and down with economic fluctuations, and may again. But supplements are in fact becoming "inherent rights."

Labor members of the WSB main-

HAVE YOU SEEN THIS NEW WEAR·EVER ALUMINUM Tote Box?

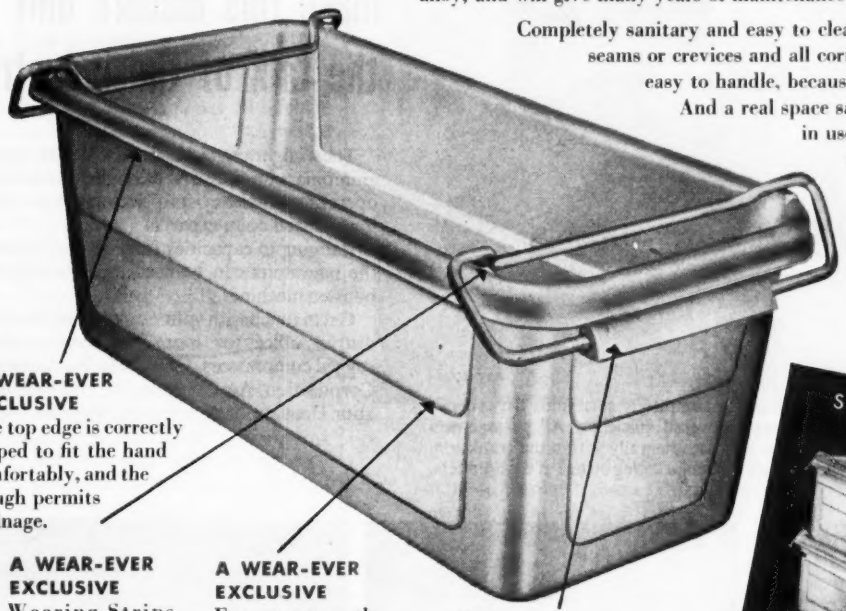
No other food transport container gives you all these features:

This is the only transport box of its depth (12 inches) that is drawn seamless from a single sheet of metal. Yet it is made of extra tough, heavy-gauge aluminum alloy, and will give many years of maintenance-free service.

Completely sanitary and easy to clean because there are no cracks, seams or crevices and all corners are rounded. Light to lift, easy to handle, because it's made of *aluminum* alloy. And a real space saver because it not only stacks in use, but nests when empty. Mail coupon today for a Wear-Ever representative to call and show you this amazing new tote box.

Inside top measures
13½" x 32"

Inside bottom measures
11" x 29½"



A WEAR-EVER EXCLUSIVE
The top edge is correctly shaped to fit the hand comfortably, and the trough permits drainage.

A WEAR-EVER EXCLUSIVE
Wearing Strips brazed on top rim where handles rest.

A WEAR-EVER EXCLUSIVE
For extra strength, double embossing on sides and ends, triple debossing on the bottom.

A WEAR-EVER EXCLUSIVE
One long handle bracket (instead of two). Greater strength, is easier to clean.

WEAR·EVER Aluminum

Standard of Quality for more than 50 years

WEAR-EVER ALUMINUM TRADE MARK REG U.S. PAT OFF

The Aluminum Cooking Utensil Company, Inc.,
305 Wear-Ever Bldg., New Kensington, Pa.

Please have a representative call and show us your new tote box with its exclusive features.

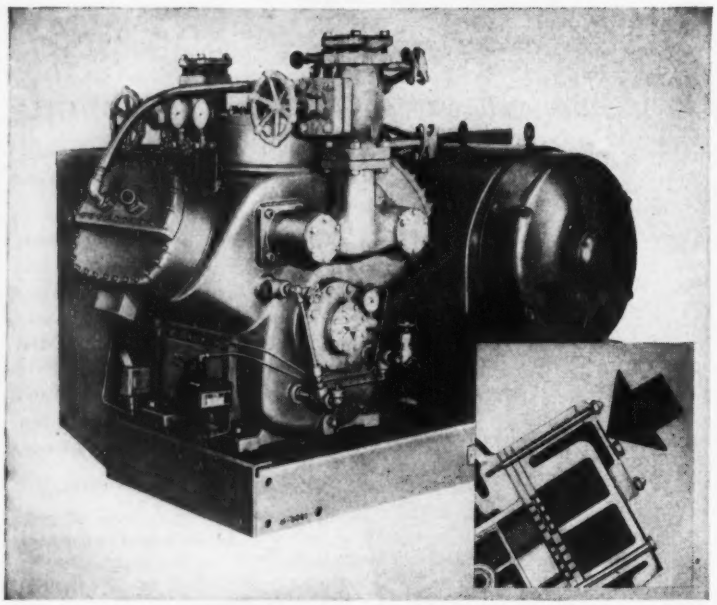
NAME .....

TITLE .....

Fill in, clip to your letterhead and mail.

For more information, use coupon on page 177.

Look at all the features of Worthington's new high-speed ammonia compressor



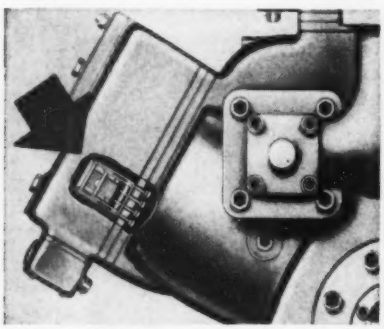
IMPROVED INTERNAL MANIFOLDING—cool suction gas completely surrounds the cylinder walls, providing longer valve life and increased overall efficiency. All passageways between suction discharge and shutoff valves are cast integrally within the crankcase, eliminating outboard fittings. Cross section shows water jacketing on one of the cylinders.

High operating efficiency and lighter weight make this modern unit the talk of the industry

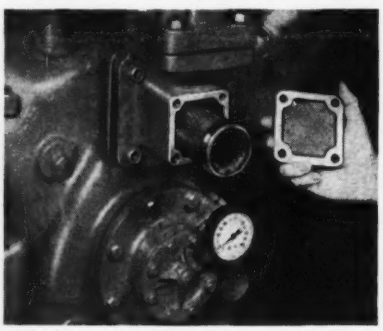
These lightweight, compact Worthington ammonia compressors have the same high operating efficiency and versatility as their lower speed counterparts.

Ranging in capacities from 18 to 150 tons, the new units can be used as high-stage or booster machines.

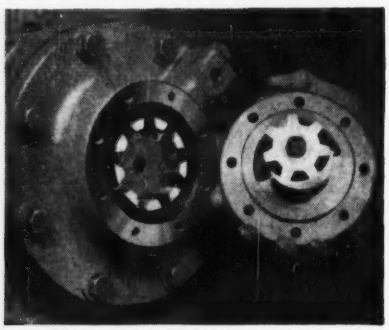
Get in touch with your nearest Worthington district office for more facts about these rugged compressors. Or write to Worthington Corporation, Air Conditioning and Refrigeration Division, Section A.3.56, Holyoke, Mass.



ELECTRIC UNLOADING—a new achievement in variable capacity control. You can start compressor with a normal torque motor; power consumption is automatically balanced against load. Separate unloader units allow easy maintenance . . . no oil or gas pressure lines to worry about.



NEW SUCTION MANIFOLD, with cover plate over suction strainer inlet, allows easy removal of the suction gas strainer for cleaning, without disturbing any of the pipes, valves or other parts. The strainer is unique in that it fits entirely within the crankcase manifold, requiring no additional space.



NEW FORCE-FEED LUBRICATION SYSTEM — full pressure, positive lubrication, regardless of rotation. A new rotary oil pump, driven directly by the crankshaft, eliminates complicated and noisy gear trains. Oil is filtered through a strainer in the crankcase for protection of pump and other moving parts.

A3.56

WORTHINGTON

CLIMATE ENGINEERS TO INDUSTRY, BUSINESS AND THE HOME

tained that fringes were not income and, therefore, could not be inflating, a contention also presently held by many union officials. Likewise, some managements do not consider supplements as pay for work performed, but rather as a means to—or the price of—reduced turnover, more effective recruiting, and higher employee morale. And since the benefits are not considered income, they are not considered inflationary.

When a supplement is added to the cost of labor, whether voluntarily or as a result of bargaining, the cost of the benefit must be added to the selling price of the goods or products, if the company is to make profits and stay in business. Thus, the inflation cycle spirals up viciously. But—it does not come down with quite the same velocity.

No Cost Benefits

Everyone seems to have different definitions of supplements and fringe benefits, and likewise how and where they should be considered in company cost accounting.

Two types of supplements frequently classed as fringe benefits though they do add to worker income, do not increase the cost of the product. Since these benefits do not require that the cost be passed onto consumers for final payment, they are, therefore, not inflationary.

Incentive pay, proportionate to increase in output above an accurately determined norm raises worker income, but does not increase the cost of the product. In fact, it usually lowers the cost somewhat.

Another so-called fringe benefit is profit-sharing. Here again, however, when employees participate in the profits above a predetermined level of expectancy, their additional earnings have not added to the cost of the product. Rather, the unit labor cost has been lowered, through greater worker productivity. This gains for them a participation in the profits.

Gaging Value of Benefits

Some managements consider the investment in fringes as profitable, while others consider it an unavoidable cost forced on them by collective bargaining. Failure to obtain immediate and tangible values, from at least a portion of supplements, is often a failure on the part of management to make capital of the payments.

Whether calculated or not one major gain may result from the trend to certain extensive fringe benefits. As Richard P. Doherty, director, Employee-Employer Relations Department, National Assn. of Radio &

removes risk of contamination in food processing and canning

Juices, acids, alkalies, fats, oils . . . *all liquids* remain on the surface of solid woven Globe Kanry-Tex Belting. Neoprene latex impregnation of all fibres and voids *locks them out!*

Odors and flavors are not picked up nor imparted. Neoprene latex impregnation stands guard against them!

There you have two BIG reasons why fruits and vegetables conveyed with non-absorbent Kanry-Tex are not contaminated en route . . . why sorting and inspection are accomplished without adding "foreign" taste.

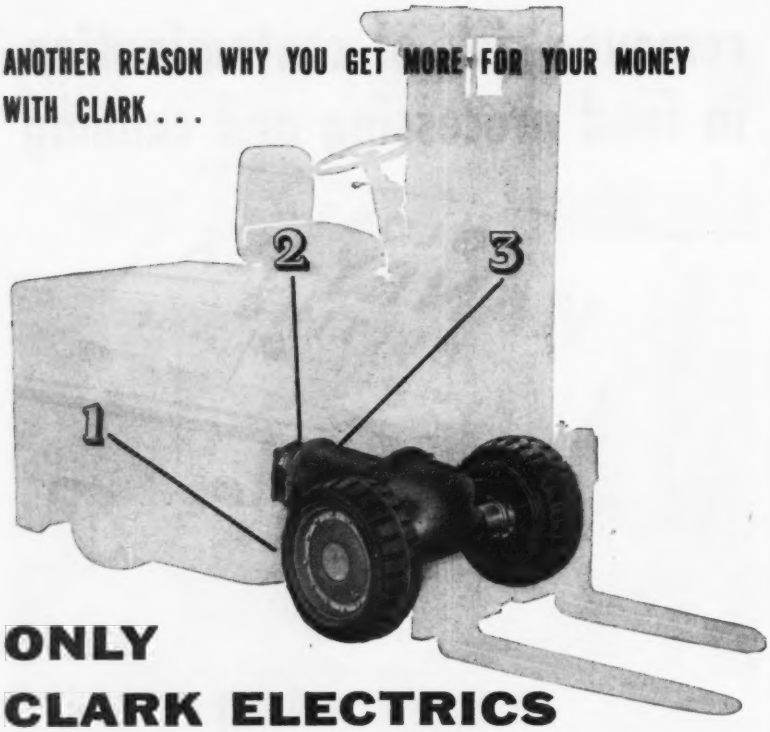
But there are other reasons — all just as important to food processing, canning and dehydrating plants — why Neoprene latex-impregnated Kanry-Tex is the most satisfactory of all belting. It may be washed and sterilized with hot water or live steam. Age won't deteriorate it — fibres are rot-free. There are no plies to separate. It's a solid woven carcass. It's tough, lasts longer, thereby reduces belting costs and downtime for changeover. Extremely flexible, it can be run over small pulleys. It permits slitting and trimming to narrower widths with clean-cut, unfrayed edges.

Prove it to yourself with free samples and literature. Write Dept. E today for samples, literature, prices and the names of local distributors.

GLOBE WOVEN BELTING CO., INC.
1400 CLINTON STREET BUFFALO 6, NEW YORK
KNOWN FOR QUALITY THE WORLD OVER

For more information, use coupon on page 177.

ANOTHER REASON WHY YOU GET MORE FOR YOUR MONEY WITH CLARK . . .



ONLY CLARK ELECTRICS GIVE YOU THREE

independent braking systems

1 **Hydraulic service brakes on the drive wheels:** by incorporating the internal expanding double-shoe design with large braking surface, positive control of the truck at all times is assured for even the severest service requirement.

2 **"Dead-man" brake on the armature shaft:** this positive acting brake takes hold automatically the instant that the driver leaves the truck—disconnects the power, returns all controls to neutral, assures that the truck will *remain* stationary.

3 **Dynamic braking by reversing current through the drive motor:** this braking method permits smooth deceleration, with no grabbing; but positive automatic control eliminates all danger of damage to electrical motors and controls.

This three-way braking system is another exclusive feature of Clark electric fork trucks—the safest electric trucks on the market. It's another good reason for talking to your local CLARK dealer (see the Yellow Pages of your phone book) when you're in the market for electric fork trucks.

And remember: Only Clark has no axe to grind for any particular type of truck. We produce them all: gas, electric, diesel and L.P.G. fork trucks; POWRWORKER hand trucks; ROSS Carriers. For unbiased experienced counsel on all materials handling problems, see your Clark dealer today.

WRITE FOR FREE BOOKLET DESCRIBING THE FEATURES AND ADVANTAGES OF CLARK ELECTRIC FORK TRUCKS

CLARK EQUIPMENT

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 14, Michigan

Television Broadcasters, pointed out before a meeting of the California Personnel Management Assn., "the paycheck has become only part of the story for virtually all American employees. Most employers accept this fact as a sound basis for labor-management relations. But, nevertheless, we wonder how far fringe benefits will continue to mount above present levels."

How to Pay for Gains

Herein, he pointed out, rests a very difficult policy decision for American industry: If private business provides for medical care, hospitalization, pension income, and related welfare programs, there is little likelihood that socialized medicine and further broadening of social insurance will be undertaken by the government. Also, there is rather substantial agreement among industrial leaders that business should provide some forms of sickness and welfare insurance. Yet, how far can American industry afford to go in underwriting these health and welfare programs? Will the American consumer absorb these costs in prices of goods and services? Or should we prefer the taxation road for these social objectives? If national taxation is to be avoided, should not health and welfare insurance be borne *jointly by worker and employer?*

But this latter situation has its complicating aspects, too, as Mr. Doherty also points out when he says, "One significant trend may be found in future efforts to make the union, itself, the insuring agency, or a joint participant and administrator of health-welfare insurance and pension programs. There are some very moot social and economic problems attached to a widespread movement of this type. Existing legislation provides inadequate controls over any such welfare process if the workers, the union, the employer, and the general public are to be protected for the benefit of all concerned.

Unions Want More

It is not improbable that union demands for the next few years will include upping the magnitude of existing supplements, plus the addition of as many new ones as possible. In view of the high proportion of food-worker compensation that is now in the form of benefits, it would be well to avoid additional supplements unless there are valid reasons for their existence. Smallness of the cost is no justification for adopting additional benefits.

Mr. Doherty's comment on this subject also is significant: "Management

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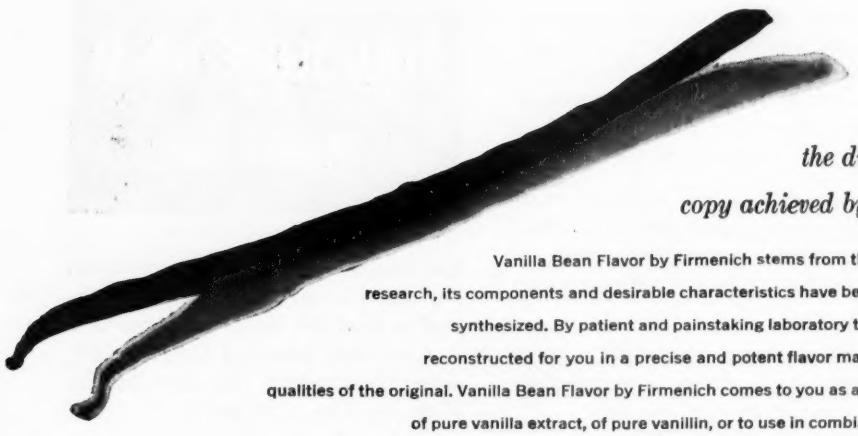

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Help fleet keep its bearings! Mr. Herman Heinze (left), fleet superintendent for Armour and Company at Denver, and Mr. Gordon James of Standard Oil, note how effective lubrication has kept diesel engine liners and bearings in good condition despite 157,000 tough miles of operation.

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● The big diesel unit shown above is one of a mountain-climbing fleet of trucks operated out of Denver, Colorado, by Armour and Company. Lubricated by STANOLUBE HD-M Motor Oil, it was recently taken in for overhaul after operating 157,000 miles over steep grades and under extreme weather and temperature conditions.

The liners had less than .005 inch wear and showed no signs of scoring. They were reinstalled for further service. There was very little bearing wear and no pitting. Rings were free. The engine, overall, was clean and in good condition.

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May 1954

SCRUBBING | *Questions & Answers*

must steel itself against the creeping expansion of fringes. There is always the extra holiday. Paid vacation periods keep growing longer. Severance pay, tailored to fit specific layoff circumstances, often inch up to rather preposterous and highly costly levels. Holidays and vacation privileges have been translated into accumulated equivalent bonuses to returning veterans. Certain justifiable pay for time off can get itself broadened into paid time off for funeral attendance, pay while on National Guard duty, pay for time to visit Red Cross Blood Banks, paid time spent in Civilian Defense training, pay for time spent on jury duty, etc."

Must Procedure

Three procedures for food plant management seem obvious: First, there should be a cost-analysis system that realistically determines the price of fringe benefits to the company. Second, employees must be made to understand the cost of, as well as the value of, the supplements they receive. And, third, management must approach every union negotiation with all the facts and figures on the benefits, along with the costs for other companies in the area and in the industry.

It must not be overlooked that business doesn't and probably cannot, cut back fringe benefits when prices fall and business recedes. The high price for the current fringe-package may well become a very serious cost problem if and when American industry faces a future leveling off or readjustment period.

End (*Resume reading on page 90*)

Idle Units Work

—*Continued from page 71*

milk evaporators in operation during the late winter months when they are quite often idle. In many dairy concerns, used single-service containers of the 5-gal. type are readily available at small cost.

The milk producer would be relieved of the task of concentrating sap at the farm and, if he delivered his milk to the dairy, he could probably find room on his vehicle for the maple sap. It might even become practical for a dairy to use idle milk tank trucks for hauling of maple sap from the farm to the milk evaporator.

Finally, one should not discount the excellent public relations a dairy company could generate by such a cooperative arrangement with its milk patrons.

End (*Resume reading on page 72*)

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Fig. 645

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2517 E. ONTARIO ST.
PHILADELPHIA 34, PA.

Questions & Answers

THIS MONTH'S PROBLEM

Color Changes in Cherries

Question—We've got a problem that's baffled us. Our sour cherries lose their red color during processing and freezer storage. Do you know the cause?

FEBRUARY PROBLEM

Bubbles in Sandwich Spread

Question—We've been attempting to vacuum-process sandwich spread on a pilot-plant scale with the object of extending product-shelf life. Finished product, however, is objectionable inasmuch as it contains a lot of air bubbles. Do you have any suggestions as to the cause of these bubbles and how they can be prevented? For your information, here are the steps to our process: (1) Vinegar, salt, mustard powder, and egg yolks are mixed in the regular way—without vacuum. (2) Salad oil is introduced and mixed with the batch under 10 in. of vacuum. (3) The batch is then mixed under 25 in. of vacuum to produce a mayonnaise that is free of bubbles. (4) To two parts of mayonnaise, one part of vegetable relish is added, and the batch is mixed under 25 in. of vacuum.

Answer—When pulling a vacuum in the final stage (after adding relish to the mayonnaise base), moisture evaporation and expansion of air in the chopped vegetables take place. This then results in a bubbly product.

What takes place is similar to the experience of the confectioners who puff mints in specially designed vacuum processes. Vacuumizing equipment really expands some products as much as 30 times original volume.

Cake Mix Formulas

Question—Can you furnish me with formulas for making prepared ginger bread and devil's food cake mixes?

Answer—The following formulas are basic and can be changed slightly, if necessary, to get the desired results.

To make a prepared ginger bread mix, blend: Flour, 45 lb.; sugar, 20 lb.; molasses, 15 lb.; shortening 10 lb.; egg yolks (dried), 3 lb.; baking powder, 3 lb.; skim milk powder, 2 lb.; soda, 1¼ lb.; ginger (ground), ⅔ lb.; and cinnamon (ground), ⅓ lb.

Prepared devil's food cake mix is made by blending: Flour, 35 lb.; sugar, 35 lb.; shortening, 10 lb.; cocoa powder, 7½ lb.; skim milk powder, 4 lb.; egg yolks (dried), 3½ lb.; baking powder, 2¼ lb.; salt, 1½ lb.; soda, 1 lb.; and small amount of vanillin.

More on Dried Yeast

Question—Referring to your December Q&A on "Yeast As an Antioxidant," we would like to know the type of yeast used. Was it compressed, active dry, or inactive dry yeast? If the yeast referred to is the latter, does an enzyme in the yeast provide the retarding effect? Would fungal enzymes give the same results? Could the yeast also be used in butter and imitation French cream icings that are topped on cakes?

Answer—"The yeast referred to was inactive Brewer's dried yeast.

"Investigators don't know what in the yeast is responsible for retarding rancidity. However, researchers are currently attempting to find out.

"Most enzymes are destroyed during normal processing of Brewer's dried yeast. So it's unlikely that an enzyme is responsible.

"Since it is not an enzyme that acts as the antioxidant, we doubt that fungal enzymes would achieve the same results. To our knowledge, no one has tried fungals in this way.

"Rancidity should be no problem with butter or French cream icings, since baked goods topped with them are only kept a few days. But if you are considering using these icings for frozen baked goods, then rancidity may become a problem. However, no one has yet tried using Brewer's dried yeast for this purpose."—*Elsie Singruen, Brewers Yeast Council, Chicago.*

How Would *You* Do It?

Readers are invited to submit to FOOD ENGINEERING answers to "This Month's Problem."

Selected answers will be published with credit (unless you specify otherwise). We pay space rates.

What is *Your Problem?*

Subscribers also are invited to send in food engineering questions. We undertake to provide answers, free, to the best of our ability. We do not undertake costly investigations. Give full information and your name. Your identity will not be disclosed.

Write to Questions & Answers Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.

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On Operating a Fumigator

Question—Can you outline precautions to be followed in installing and operating a fumigating vault, employing methyl bromide as the fumigant?

Answer—The toxicity of fumigants presents hazards to personnel and requires considerable caution in their use. Space does not permit complete details on safeguards to be observed. Consequently, we can only outline main ones.

We suggest you contact fumigant manufacturers, local health authorities having jurisdiction where your plant is located, your insurance carrier, and such authoritative publications as USDA Bureau of Entomology and Plant Quarantine, Circular E-601, for the necessary detailed operating information.

Fundamentally, one of the most important considerations is to set up a full and complete set of instructions governing the fumigating operation. Then a reliable supervisory official should be assigned to bear the entire personnel responsibility for their observance. References already cited should be used in compiling these instructions.

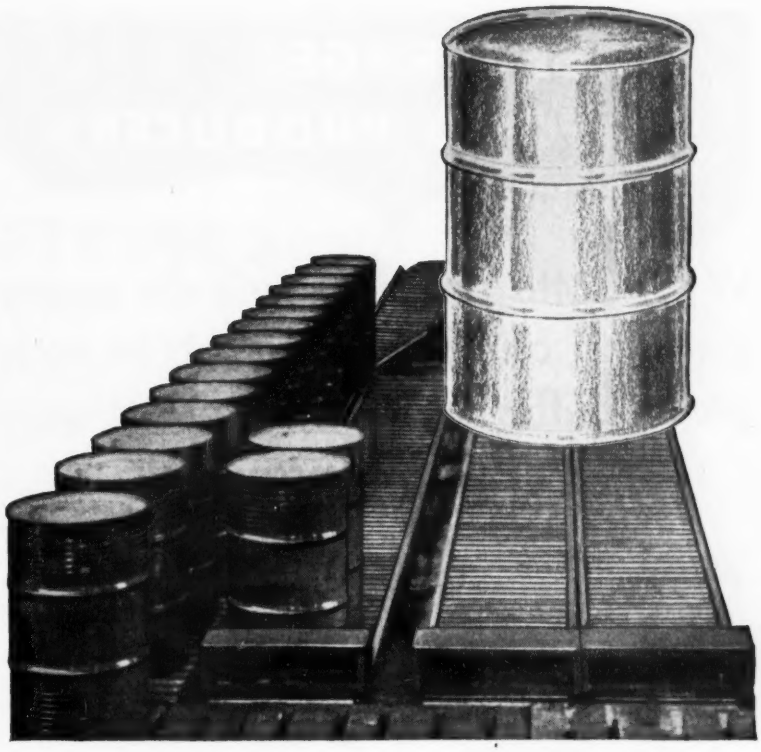
It is, of course, obvious that a fumigating chamber must be built of gas-tight construction—doors as well as walls. What might not be so obvious is to provide adequate protecting bumper rails and guard posts at intervals around the walls and at the door to prevent accidental damage by trucking or handling operations likely to result in gas leakage.

If possible, it would be desirable to locate the chamber as near the receiving point as practicable.

Handling of gas cylinders within the plant is a source of possible accident and should always be carried out under the direct supervision of the responsible person. He should, of course have access to an approved type of gas mask at all times. Always observe the standard precautions for handling of compressed gas cylinders —protect against falling; store in cool, well-ventilated locations; and prevent unauthorized tampering.

Q. Is the use of sulfur dioxide permissible in pre-peeled potatoes?

A. The use of So_2 is allowable provided that the preservative is not added to conceal damage or inferiority, and that interstate shipments are properly labeled. However, several states have placed restriction in the use of sulfites. So it would be best to first consult the regulatory agency in your state before commencing commercial operations.



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Actual fumigation must provide exposure of raw materials or finished products to adequate concentration of gas for the required length of time. Provisions must also be made for heating during cold weather and for forced circulation of gas within the chamber to make sure of complete penetration.

Air-tight precautions must be set up to make absolutely certain that all personnel are out of the chamber before it is sealed and gas admitted. Equally stringent rules must be enforced on testing the atmosphere after exhaust-fan operation at the end of the fumigating cycle and before the chamber is opened. If methyl bromide is employed, a halide-indicator lamp should be used to determine the presence of this fumigant.

On Diabetic Ice Cream

"From our knowledge of using synthetic sweetening agents in ice cream, we wonder if the amount of saccharin specified in the mix formula (FE, Jan., '54, p. 211-212) might not be in error. We believe about 20 times the amount of saccharin specified (0.02%), would be necessary for adequate sweetening. Also, we believe about 0.25% of sucaryl sodium would be necessary to sweeten a mix made by the same formula.

"For your information, here's a formula for a diabetic ice cream that was submitted to us by Dr. P. H. Tracy, Dept. Food Technology, University of Illinois:

"Cream (40%), 30 lb.; skim milk, 58 lb.; glucose, 3 lb.; glycerin, 5 lb.; stabilizer, 3-4 lb. (amount depends upon stabilizer used); gelatin, ¼ lb.; and sucaryl sodium, ¼ lb.

"Formula contains 31.4% total solids, about 12% fat, 12% carbohydrate, and 6.8% protein. It pro-

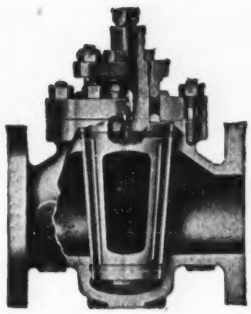
Q.—We are considering using soluble coffee as a flavoring agent in one of our products. Do you know if MSG (monosodium glutamate) can be added to intensify the flavor of the coffee?

A.—Soluble coffee is sufficiently strong as a flavoring agent as not to justify the use of MSG. If you want a stronger flavor, all you need do is add soluble coffee.

However, we might add that suppliers of MSG are at the present time carrying out research on possible use of MSG to enhance the flavor of soluble coffee. You can enhance the flavor of coffee by incorporating a small amount of chicory, but we question if the resulting flavor is what you might desire.

● VALVES

● PIPE FITTINGS



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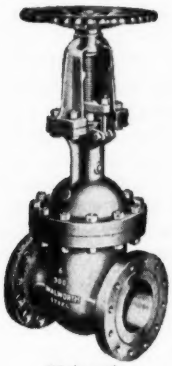

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Because it is corrosion resistant, nontoxic, tasteless, and can protect steel with a very thin coating, tin is a perfect metal for the packaging of food. Today, no other kind of food container combines all the advantages of the tin can.

Tin cans are light, strong, compact and economical. They protect against light-damage to contents. They can be easily handled in mass without breakage. They are more convenient for the consumer both to store and to use in the home.

More than 400 different food products now come in cans. And the list is still growing. Whole fluid milk, for example, will soon be widely available in tin cans. Canned carbonated soft drinks are rapidly gaining in popularity. A new process now makes it possible to pack cooked white rice in tin cans. And the frozen food industry is turning more and more to this type of container.

Currently over half the tin used in these cans comes from Malaya. Known as Straits Tin, this metal is at least 99.87% pure. It is world famous for its absolute reliability of grade—all-important in producing the tin plate cans are made of.

The supply of Straits Tin will continue to be fully as dependable as the supplies of other materials produced in the Free World. And with ample reserves of Straits Tin available for the future at a fair and reasonable price, does it make sense to seek substitutes for tin cans that will not be better—may not be as good—and will probably cost more?

THE MALAYAN TIN BUREAU

Dept. 267, 1028 Connecticut Ave., Washington 6, D.C.

MALAYAN TIN BUREAU

vides about 183 calories per 100g. This formula has about 10 calories per 100g. less than the one printed as well as 48 instead of 61 carbohydrate calories per 100g."—*Karl Beck, Technical Service Representative, Chemical Sales Division, Abbott Laboratories, North Chicago, Ill.*

Trouble Packaging Poultry

Question—We've been successfully packaging frozen poultry in polyethylene. However, we have been running into difficulty in using cellophane for packaging fresh poultry. After a couple of days, poultry tends to become slimy. Can you suggest a suitable type of package that might overcome this objectionable condition?

Answer—Undoubtedly, you are using a fully moistureproof cellophane. We suggest that you contact your supplier for a semi-moistureproof packaging material with high gas permeability. There is a suitable type of cellophane for your purpose.

Such a material will not only eliminate formation of slime and mold, but also accumulation of odors inside the package. While these odors are not indicative of spoilage, they are offensive to customers.

Another thing. Make certain that the packaging material selected is durable enough to withstand punctures from bony protrusions.

We must caution you that good packaging is no substitute for improper refrigeration. Packaged fresh poultry should be shipped and held in refrigerated display cases at 32-38 deg. F.

More on Dressings

Question—*Referring to your February Q&A on "Keeping Dressings Longer" (p. 178), please advise what inhibitors have been used to prevent crystallization of salad oils. What is meant by solvent crystallization method for refining?*

Answer—"Several patents have been issued on the addition of small amounts of polymerized glycerides to salad oil to extend the cold test. These glycerides are effective at levels as low as 0.01%, and they can produce oils with cold tests of 75-100 hr.

"These polymers are usually prepared by air blowing (with heat) oils that are chiefly composed of mono-unsaturated, di-saturated glycerides. If, however, a considerable amount of di-unsaturated glycerides are present, cross-linkages occur and result in the formation of large polymeric molecules that are insoluble in salad oil. With mono-unsaturated, di-saturated glycerides, on the other hand, the un-

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In Bay City, Michigan, the Bay City Freezer company operates an ice plant, a cold storage plant, freezer lockers, and a frozen food packing plant. Naturally enough, refrigeration is a mighty important item to them, and the story of the savings they have made in the past twelve years—with Vilter equipment—is an interesting one.

Bay City Freezer, Inc. began operations in 1921, using horizontal refrigeration compressors. In 1942 they replaced them with two Vilter Vertical Compressors and a Vilter Booster. The immediate effect of the change was the availability of half their engine room space for storage, because of the compact Vilter equipment. Even more important was the fact that the automatic Vilter system let them use one engineer instead of three. Bay City Freezer *paid for the entire installation in a little more than a year*. Now, after twelve years, their Vilter equipment continues to pile up those savings. Naturally, they're "very much satisfied" with Vilter.

Perhaps refrigeration can't make savings like that in your plant . . . but it's almost certain that Vilter's knowledge of refrigeration coupled with the established lower operating and upkeep costs of Vilter equipment can bring about important savings to you. Plant after plant is saving money with Vilter. Probably you can, too.

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saturated fatty acid radicals can link to form double molecules (dimers). These then act as inhibitors of crystallization.

"In solvent crystallization, the oil is first dissolved in a solvent. The stearine, which is insoluble in the solvent at certain temperatures and pressures, separates out. It is then removed from the oil by filtration. With this method, better separation of stearine from oil is attained. And, as a result, a higher cold test is achieved. After all, the cold test of a salad oil is greatly proportional to its stearine content.

"The only practical value of a high cold test oil is the possibility of producing more stable emulsions in mayonnaise and salad dressing."—*R. W. Bates, North American Laboratory Service, Chicago.*

Q.–Can you furnish me with a formula for powdered doughnut sugar?

A.–Melt 50 lb. of shortening (about 95 deg. F. melting point), and then cream in vertical, batch-type, beater mixer with a small amount of dextrose sugar (powdered). Then gradually work in balance of dextrose, until a total of 750 lb. are used. Next, beat in cake flour, 100 lb.; sugar (powdered), 90 lb.; and vanillin, to suit (about ¾ lb.).

Now transfer batch to a horizontal, batch-type mixer, and thoroughly blend. Then sift batch to remove lumps, and package.

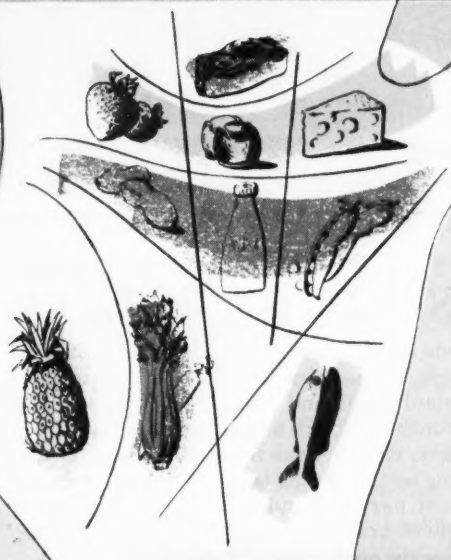
Query on Motor "Specs"

Question—In the interests of standardizing and cutting maintenance costs, we would like to improve our specifications for electric motors on equipment to be purchased in the future. We find the terms drip-proof, water-proof and the like confusing, and would appreciate guidance on the terminology and correct application of various available motors.

Answer—Electric motors are variously classified, according to size, application, electric type, variability of speed, and mechanical protection. The duty requirements of a particular motor—whether for a bottle conveyor, heavy-duty mixer, or pump—will usually determine fairly rigidly the characteristics of size and variability of speed. In other words, it takes a certain amount of power and speed to do a specific job. And you won't have too much choice once you have given the equipment or motor manufacturer details on the job to be performed.

From a standpoint of electric type, available current will, of course, determine whether motor will have to be

WHAT WE CAN TELL about food processors



Without palmistry, but from a look at our list of customers, we can tell that more and more food processors are making use of materials handling equipment, once considered strictly for bakery use, but which in recent years has met with continued acceptance and endorsement by food processors throughout the industry.

READ STANDARD CORPORATION
Bakery-Chemical Division
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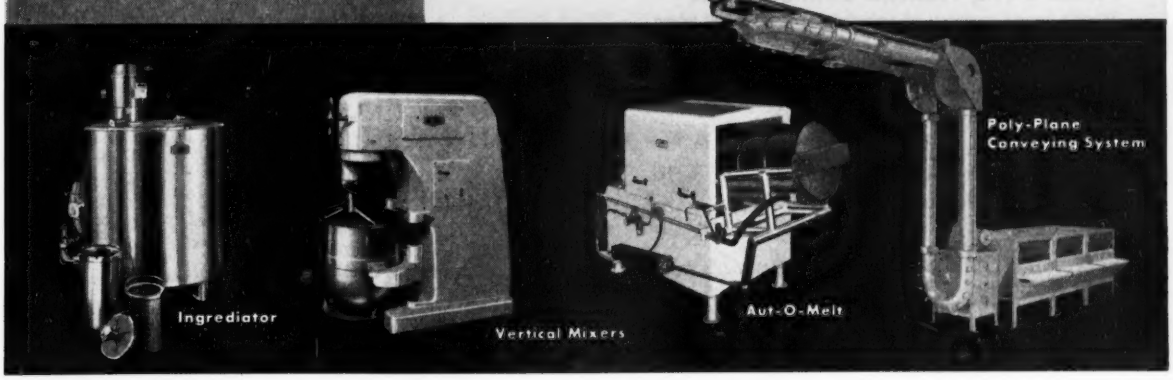
We'll predict that if you have a materials handling problem, you'll find a solution by writing Read Standard for further information.



For more information, use coupon on page 177.

Here's how Standard Fruit and Steamship Company unloads VISQUEEN-packaged bananas at its Charleston, S. C. Terminal.

An assist to Nature

Until VISQUEEN came along, bananas got no special protection on ship, train or truck. Losses from bruising were sometimes heavy. Now Standard Fruit and Steamship Company find that envelopes of sturdy VISQUEEN film protect the fruit from plantation to market, reduce losses from bruises and bumps, keep the fruit looking better, tasting better. VISKING engineers played an important part in helping develop this package. They, and converters of VISQUEEN film, can assist you to get better packaging. Use the coupon for this help.

Important! VISQUEEN film is all polyethylene, but not all polyethylene is VISQUEEN. VISQUEEN film is produced by process of U. S. Patents No. 2461975 and 2632206. Only VISQUEEN has the benefit of research and technical experience of The VISKING Corporation, pioneers in the development of pure polyethylene film.

VISQUEEN® polyethylene film

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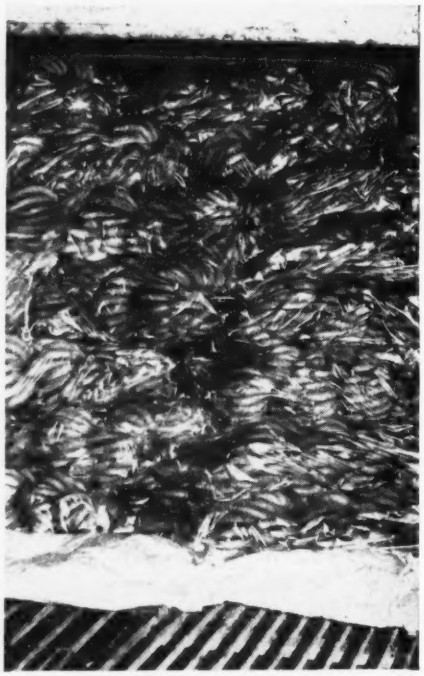

How VISQUEEN protects bananas stowed flat aboard ship.

THE VISKING CORPORATION, Box RS-1410
Plastics Division, Terre Haute, Indiana

Send me names of converters of VISQUEEN film serving my area.

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Company _____

Address _____

City _____ Zone _____ State _____

AC or DC. In the case of the former, you may have some choice on smaller motors as to whether to specify single phase or polyphase. For purposes of standardizing, you will probably want to choose an arbitrary size, such as ½ hp. as the maximum for single phase, and specify ¾ hp. and larger for polyphase. This will help your electrician keep the loads balanced on various phases.

The matter of mechanical protection (and the related one on method of cooling) probably offer the greatest field of choice. We suggest that the standards set up by the National Electrical Manufacturers' Assn. be followed inasmuch as they are generally recognized.

For example, the drip-proof construction standards call for building ventilating openings so that drops of liquids or solid particles falling at any angle not greater than 15 deg. from the vertical will not enter the motor. Obviously, the protection is more with a motor featuring splash-proof construction, which will keep out liquids or solids striking motor at any angle up to 100 deg. from vertical.

It would be our suggestion that you consider standardizing on splash-proof construction for all motors subject to moisture and splashing during normal operations or clean-ups.

Next higher degree of protection is provided by totally enclosed construction. Although not air-tight, such a motor will not have the exchange of air between inside and outside of case. This style is available with or without an integrally-mounted cooling fan. Use of a fan, however, would most likely be determined by the motor manufacturer on the basis of ambient conditions—such as unusually high temperatures.

We suggest that you consider standardizing on the totally enclosed construction for motors to be used in very wet or humid locations, or even in dusty areas. The slightly higher initial cost should be offset by lower maintenance on motors in such difficult locations.

Finally, you may require occasional explosion-proof or dust-explosion-proof construction in areas where inflammable gases, vapors, or dust abound. You will probably be guided in such cases by the provisions of the National Elec-

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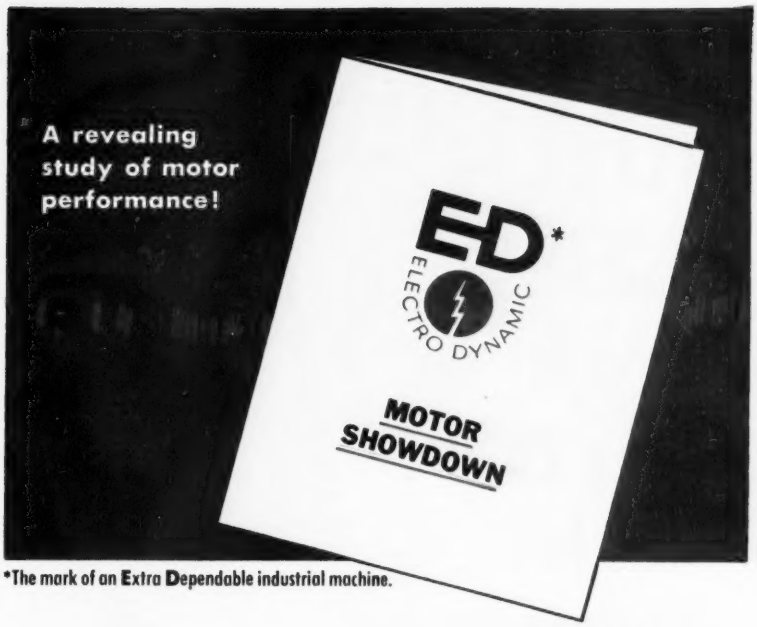
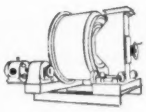
Q.—Why do some manufacturers of mayonnaise and salad dressing cool vegetable oils prior to processing?

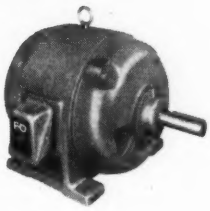
A.—Oils are cooled for two reasons: (1) To curb rancidity while stored in the plant, and (2) to improve emulsification during processing.



*The mark of an Extra Dependable industrial machine.

THIS CANDID REPORT UPSETS MANY IDEAS ON MOTOR SELECTION FOR FOOD PROCESSING MACHINES





1 to 250 hp. AC and DC. Standard or special purpose. N.E.M.A. standards.

The results of comparative performance tests* on production line models of different makes of electric motors are reported concisely in a new booklet entitled **"MOTOR SHOWDOWN"**. The facts revealed are of real importance to anyone concerned with motor selection, because the makes of motors tested power over 90% of the electrically operated machinery in *your* industry. Mail the coupon below for your copy.

*Tests certified by J. Arthur Balmford, Professor of Electrical Engineering at a leading Eastern university

ELECTRO Extra DYNAMIC Dependable motors

ELECTRO DYNAMIC • ***Division of General Dynamics Corporation***
149 Avenue A, Bayonne, New Jersey

Please send me a copy of "MOTOR SHOWDOWN" and the new catalog of Electro Dynamic industrial motors.

ED MOTOR SHOWDOWN

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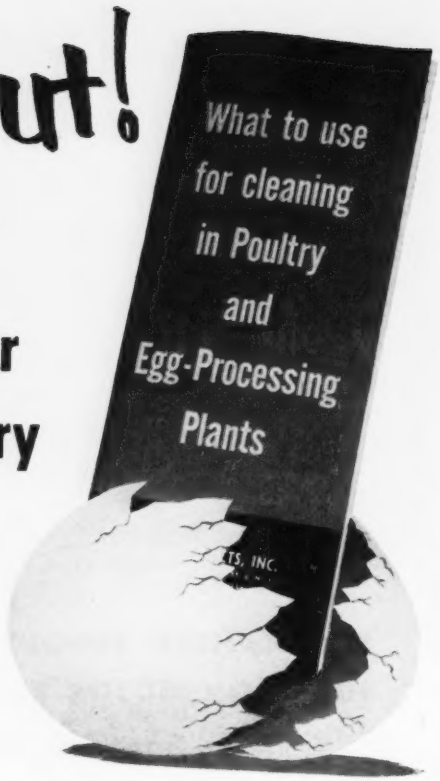
COMPANY_____

ADDRESS_____

For more information, use coupon on page 177.

Just Out!

and made to order for busy Poultry and Egg processors



Here's an information-packed guide newly written to provide Poultry and Egg processors with fast, economical, up-to-date methods of in-plant cleaning and sanitizing.

You'll find, among other ideas, a concise, easy-to-read chart listing all possible cleaning jobs; soils encountered, and the Oakite material that will best remove them. Guide also shows correct concentrations of cleaning materials, temperatures of solutions, recommended procedure. And it's all on one page for quick, convenient scanning.

At a glance, you can get economical answers to such problems as cleaning, sanitizing, deodorizing . . .

- . . . eviscerating tables
- . . . steam-jacketed kettles
- . . . containers after filling and capping
- . . . egg-breaking cups, trays, buckets
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Write for your copy today. It's yours for the asking, and you'll find it a handy reference to have on file. Address: Oakite Products, Inc., 26G Rector Street, New York 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS · METHODS · SERVICE

Technical Service Representatives in Principal Cities of U. S. & Canada

trical Code as well as others which may apply locally. We'd consider them to be infrequent exceptions to your standardization program.

On Fire Extinguishers

Question—Can you offer me some pointers on the proper installation of fire extinguishers in our plants?

Answer—You can obtain detailed information through such agencies as the National Board of Fire Underwriters and the National Fire Protection Association. However, we can give you some of the essentials, although space prevents more adequate treatment.

For occupanices of light fire hazard, fire extinguisher units should be so located that a person will not have to travel more than 100 ft. to the nearest "unit." At least one unit must be provided for each 5,000 sq. ft. of floor space, or fraction thereof.

In ordinary combustible occupancies which, in general, covers normal factory conditions, the requirements are not over 50 ft. of travel, and one unit should be provided for each per 2,500 sq. ft. of floor space.

In extra-hazardous occupancies, requirements for ordinary conditions must be met, plus installation of whatever additional units may be directed by authorities having jurisdiction.

The number of extinguishers constituting a unit has been carefully worked out, according to the type (soda-acid, water, carbon-dioxide, vaporizing liquid, foam, and dry chemical), size, and class of fire for which it is suited. Thus, a designation of "A-1", for example, means that one extinguisher makes a unit for fighting Class A fires.

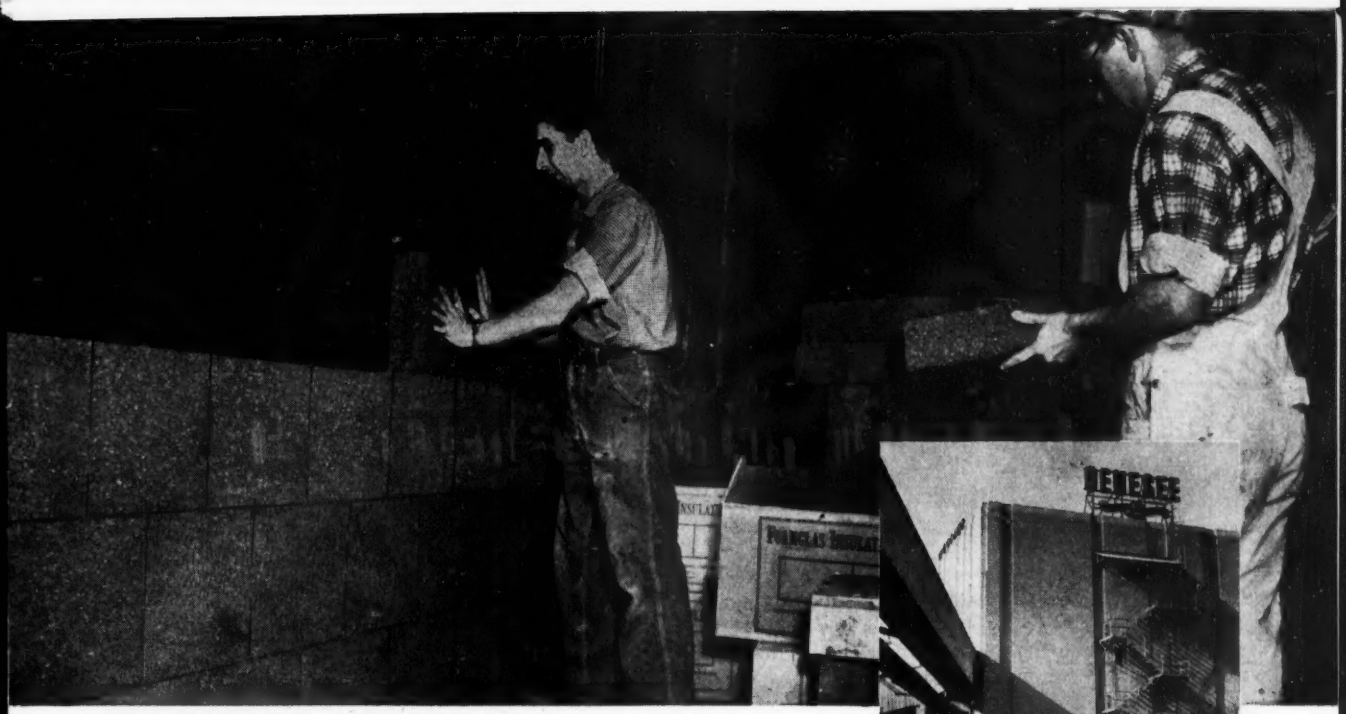
Class A denotes fires in ordinary combustibles, requiring quenching. Class B signifies flammable-liquid fires requiring "blanketing". And Class C fires are those arising from electrical equipment, for which non-conducting extinguishing agents are essential.

It is important to mount the extinguishers where they can be easily seen and reached. Top should never be more than 5 ft. above the floor, and the area around them should al-

---

Q.—Why are some processors of sugarless foods using "Sucaryl" (cyclamate sodium) instead of saccharin?

A.—Sucaryl does not impart an unpleasant after taste. However, while it is an excellent sweetener (30 times sweeter than sugar), it does not give the same body to products as does sugar. To make up for this, additional flavors are being incorporated.



Lightweight FOAMGLAS blocks are easily installed on walls of Genesee's new storage building.

Exterior of Genesee Brewing Company's new four story storage building, built in 1950 of concrete block construction. All insulation is FOAMGLAS . . . on exterior walls, roof plus an insulated fermenting room inside.

"We insulate with FOAMGLAS because it stays dry!"

states Lloyd B. Welch, Plant Engineer, Genesee Brewing Company

Mr. Welch points to one of many spots at which old insulation failed completely.

"FOAMGLAS plays a leading role in our plant expansion program because it *stays dry* to maintain constant insulating efficiency," reports Lloyd B. Welch, plant engineer at Genesee Brewing Company, Inc., Rochester, N.Y. "The strong, rigid, cellular glass blocks of FOAMGLAS enable us to use them in *free standing* construction permitting use of our insulated spaces while other construction work is still in progress."

Mr. Welch continues: "Our old insulation absorbed moisture and failed, but this presents no problem with FOAMGLAS which is impervious even to the heavy vapor concentration in the fermenting room of our storage building. There FOAMGLAS helps us maintain desired temperatures (generally 33° F.) with minimum maintenance to equipment and structure.

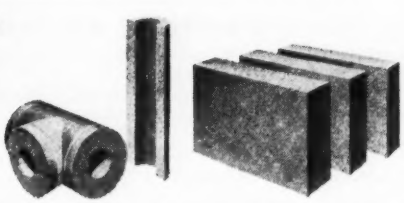
"With FOAMGLAS giving complete satisfaction in one storage building and a hops storage room, we'll definitely use it in a new storage building to be erected soon. We will continue to take full advantage of outstanding benefits from FOAMGLAS."

You, too, can do a better insulating job with moisture-proof, rat-proof, fireproof FOAMGLAS, the strong, rigid insulation that will give you long-lasting insulation service *plus* unique design advantages. Send now for our new booklets describing the use of FOAMGLAS for roofs, walls, ceilings, floors, piping and equipment. Write indicating your specific interest, to Department O-54.

PITTSBURGH CORNING CORPORATION • One Gateway Center • Pittsburgh 22, Pa.

FOAMGLAS®

the cellular, stay-dry insulation



PITTSBURGH® PC CORNING

Pittsburgh Corning also makes PC Glass Blocks

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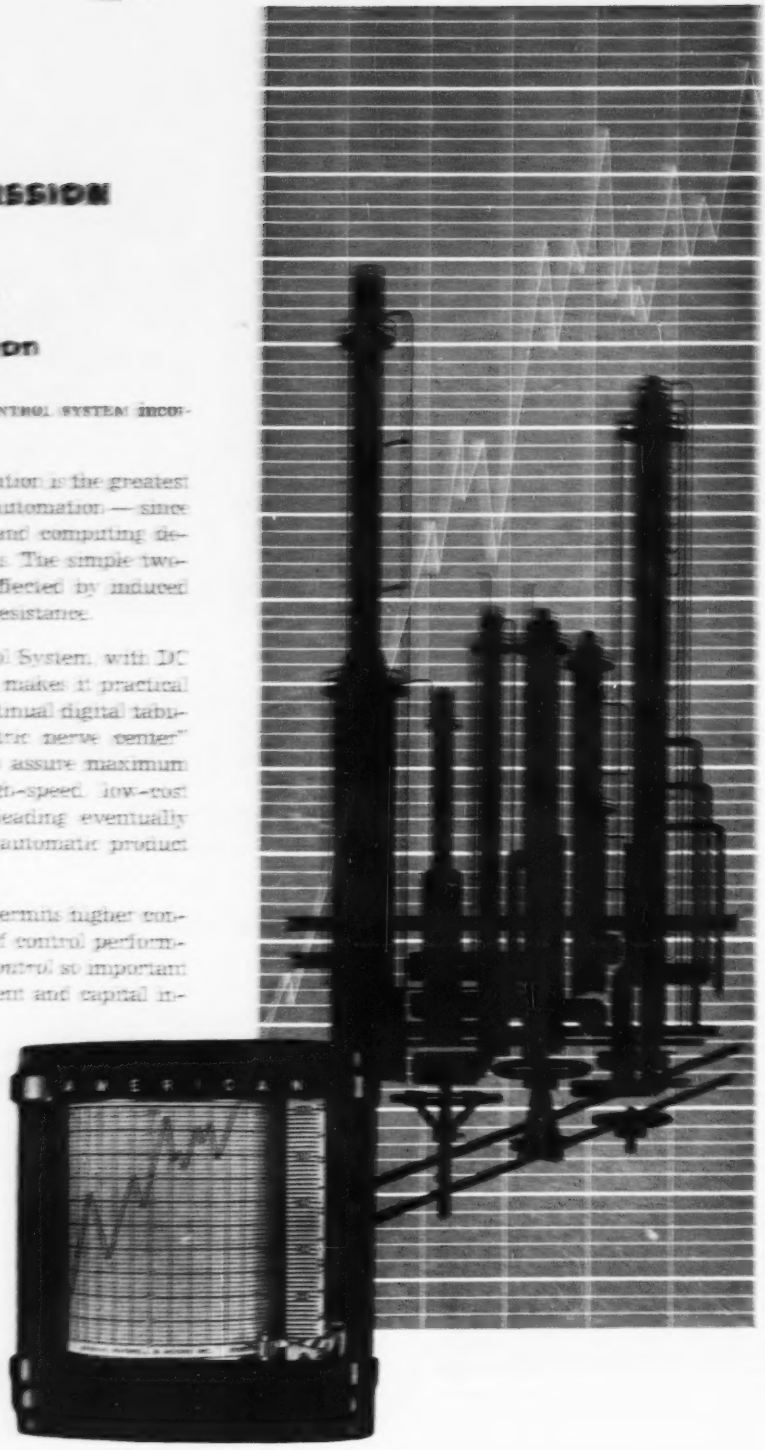
DC TRANSMISSION of process information is the greatest compatability factor for complete automation — since most electronic print-out, monitoring and computing devices use DC in their measuring circuits. The simple two-wire DC communication lines are unaffected by induced alternating currents and varying line resistance.

The American-Microsen Process Control System, with DC transmission of process measurements, makes it practical to use automatic equipment for (1) continual digital tabulation of operational data; (2) "electric nerve center" supervision of all measured criteria to assure maximum safety and efficiency; (3) precise high-speed, low-cost accounting and engineering analysis leading eventually to the ultimate in automation — fully-automatic product analysis and control.

Instantaneous DC signal transmission permits higher controller gains — creates a new concept of control performance. It offers the improved quality of control so important in reducing the size of process equipment and capital investment for a given through-put.

The all-encompassing advantages of the American-Microsen Process Control System assure the highest reliability of instrument performance, minimum maintenance and the utmost in flexibility—all vital to the economical operation of the ultra modern plant of today and the standard plant of tomorrow. Your inquiry is invited. Write for Catalog 164.



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MICROSEN INDUSTRIAL INSTRUMENTS

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Cost Burdens Eased

ways be kept clear and unobstructed.

Red, the universal fire equipment color, may be employed to direct attention to the equipment.

Has Sediment Problem

Question—We prepare English walnuts in syrup for fountain use. The syrup is made by heating to a boil Sugar, 75 lb.; water, 5 gal.; corn syrup, 1gal.; sodium benzoate, 2¼ oz.; citric acid solution (50%), 1 oz.; and flavor. Syrup is then cooled to 95 deg. F. before filling into jars along with walnuts. Upon standing, a greyish brown sediment forms. Have you an idea what this deposit is?

Answer—Formation of greyish brown deposit leads us to suspect an iron contamination. Either the syrup is picking up iron during processing or, perhaps, one of the ingredients has sufficient iron to react with tannins in the walnuts and form an insoluble, greyish brown iron tannate.

Too, you might try sifting out some of the loose skins.

Have readers any suggestions?

Bacterial Turbidity

Question—We've been cold-packing pickled pigs' feet in gallon jars without any difficulty. Recently, we started to pack frankfurters in the same manner, but without success. Soon after leaving our factory, the vinegar pickle, in which the franks are packed, becomes very cloudy. Is there anything that we can do to overcome this objectionable turbidity?

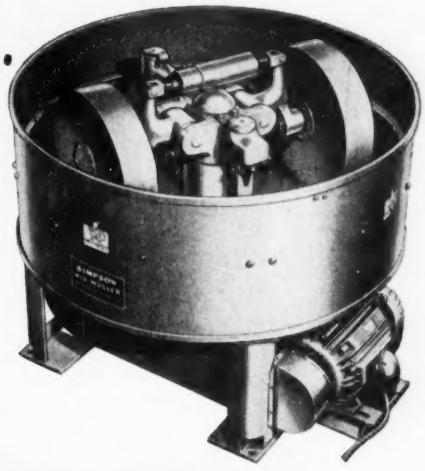
Answer—Reason why you do not have any difficulty with brine-packed pickled pig's feet is that the sugar (from the cure) is leached out of the feet prior to their being packed. It is the sugar that's leached out of the franks after they are packed that gives you trouble. This sugar supports the growth of an acid- and salt-tolerant bacteria of the *Lactobacilli* group. It is the growing bacteria that causes the obectionable turbidity. Hence, the name, bacterial turbidity.

If you check your processes, you'll find that you are cooking the pigs' feet in vats and then cold-water rinsing them several times to leach out the sugar prior to cold-packing. This is not so with the frankfurters.

There are two things that you can then do to overcome bacterial clouding. Either pasteurize the glass-packed weiners at 145 deg. F. for 30 min. or leach out the sugar from the franks prior to packing.

You might look into the possibility of pasteurizing them at 161 deg. F. for only 15 sec. (high temperature, short-time pasteurization).

℞ to relieve Quality Control "headaches"...



BLEND MATERIALS IN SIMPSON *MIX-MULLERS*

IF you are having quality control "headaches," it will pay you to take a good close look at your *mixing* operations. Experience has shown that improperly mixed materials can often be the cause of inferior end-products or processes.

The type of mixing equipment you use is, of course, the secret to properly controlled mixing. When you use Simpson Mix-Mullers, you are assured of complete control at all stages of mixing . . . with uniformly blended batches that will be the same—day in, day out—as proved by hundreds of successful applications throughout the chemical process, food and ceramic industries.

Built in twelve basic models, in capacities from 1/10 to 60 cu. ft., Simpson Mix-Mullers all give you the time-tested mulling principle of controlled mixing, with emphasis on improved quality at lower mixing cost.

Let a National Engineer show you how these versatile Mix-Mullers can help solve your particular mixing problems. Write for details.

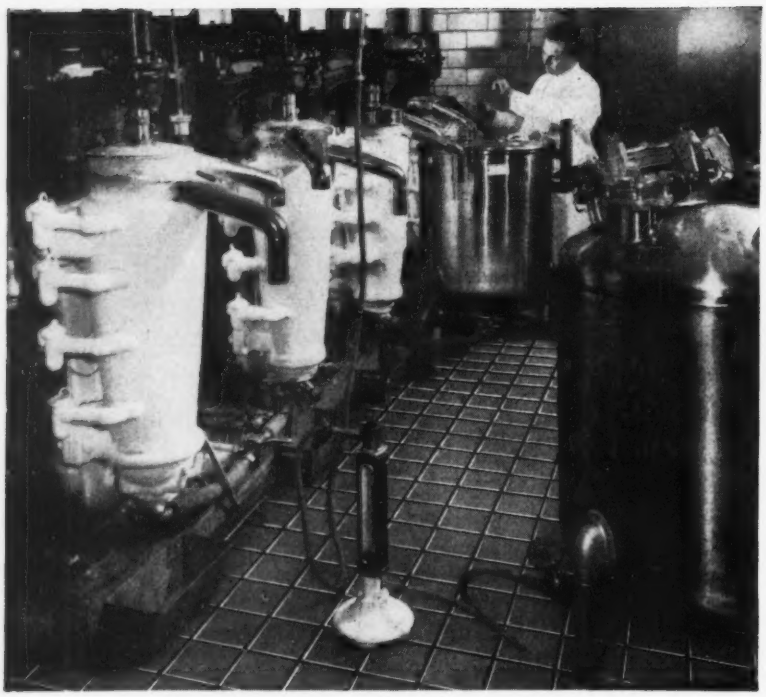
MULLING GIVES YOU POSITIVE CONTROLLED RESULTS

Watch the practiced technique of a chemist's mortar and pestle—the intensive rubbing and smearing actions—and basically, THAT'S MULLING! Mulling with a SIMPSON Mix-Muller utilizes a special pair of revolving mullers and plows mounted on a stationary pan. The mullers are adjustable and are supported by rocker arms. This leaves them free to ride on the material, creating a true mulling action as they revolve. The results are thorough, more rapid blending.

WRITE FOR LITERATURE

SIMPSON *MIX-MULLER*® DIVISION
NATIONAL ENGINEERING CO. (Not Inc.)
644 Machinery Hall Building
CHICAGO 6, ILLINOIS

For more information, use coupon on page 177.



FURNANE FLOOR installation at the newly constructed Armour Laboratories

THE PERMANENT BASE for MODERN OPERATION

ATLAS FURNANE FLOORS are the permanent base for modern operation designed specifically for the Food Processing Plant and Biological Laboratory. FURNANE FLOORS are completely resistant to all corrosive agents normally encountered, such as corrosive products formed in food processing methods and harsh alkali or acid floor cleaning agents. In addition, FURNANE FLOORS are not only durable but attractive. ATLAS FURNANE FLOORS combine improved installation and dual cement construction.

1. **BLACK FURNANE CEMENT**.. produces the full range of resistance and service only possible with ATLAS pioneered furane resin cements. It provides hard wearing vertical joints that are smooth and flush without voids. It resists all common food plant corrosives and cleaning detergents.
2. **RED FURNANE CEMENT**... provides a bedjoint over the concrete floor slab that sets fast, bonding concrete, tile and cement into one solid monolithic unit. It prevents swimming after tile is set.

Longer floor life, less maintenance cost, more sanitary conditions and a most attractive floor can be yours with ATLAS FURNANE FLOORS. Write for FURNANE FLOOR BULLETIN 3-2.

ATLAS MINERAL PRODUCTS CO.
MERTZTOWN, PENNSYLVANIA

Furnane® Reg. U.S. Pat. Office 553,217

Cost Burdens Eased

—*Continued from page 131*

When economic facts have been established on present operations, when realistic determination has been made of needed storage space, when sound estimate has been reached as to percentage of flour to come in bulk —then and only then can a reasonable decision be made with fair certainty that the depreciation costs for the bulk system will not eat up anticipated handling savings.

But there is no doubt that the action of General Mills is going to accelerate the general bulking program, and a great deal of credit should go to this organization. For the economic gains to be realized are truly tremendous when projected to include the amount of flour that may be handled in bulk in this country.

End (*Resume reading on page 133*)

Psychometric Gaging

—*Continued from page 59*

tactual or feeling properties, according to the panel.

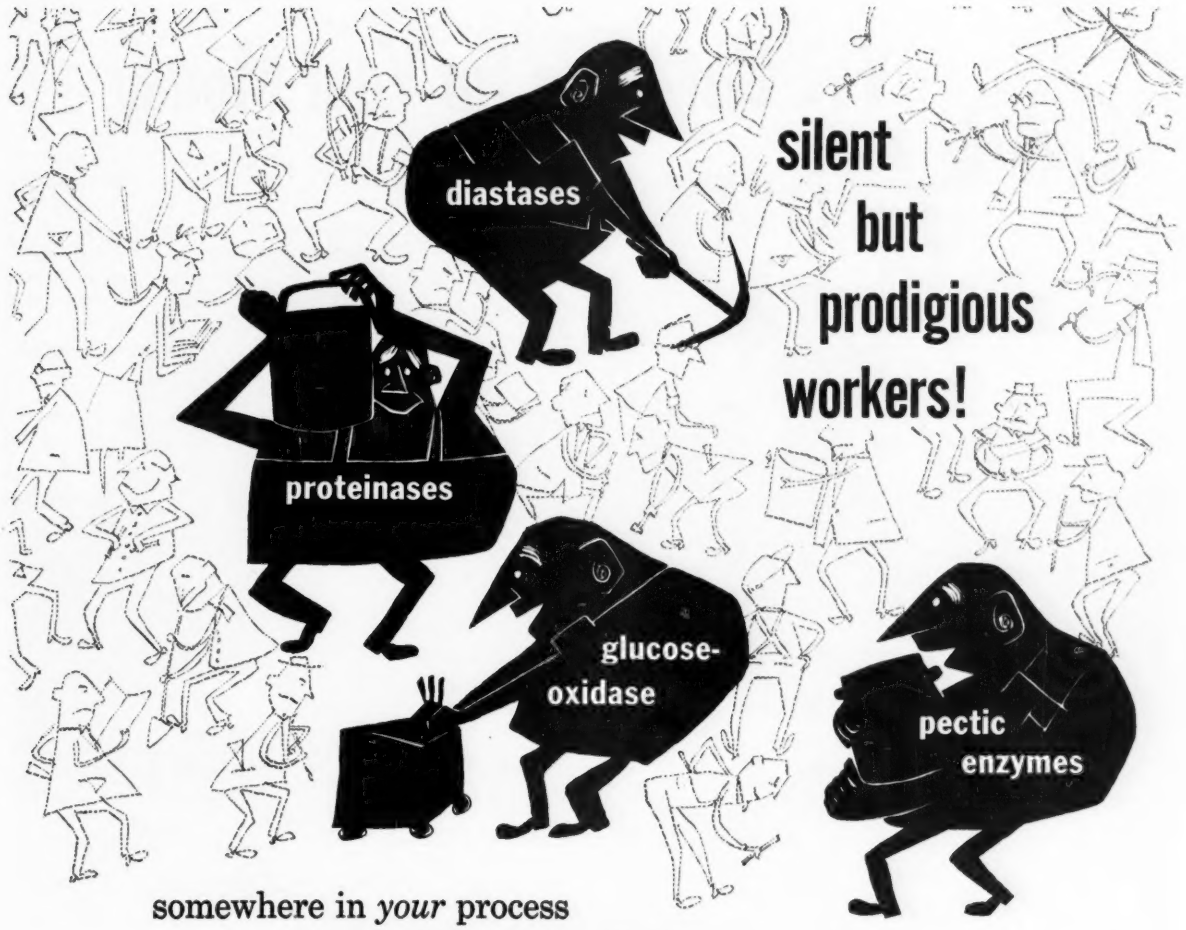
This finding was substantiated by consumers as preference for one over the other. One appeared to be very light and orange in stick form, but when applied produced the same dark cherry color as the competitive stick. The latter had no such objectionable inconsistency between stick and applied color.

Field Testing

To supplement a laboratory consumer study, a number of samples (accompanied by instructions and questionnaire) may be sent to the homes of another group of respondents. Usually, field tests are much slower than laboratory tests and must necessarily be more simple in design and execution.

Since conditions of use cannot be rigidly controlled, one can never be sure what physical insult the samples will receive, nor can the influences of time lapse, distraction, and discussion be measured. Consequently, larger number of respondents must be employed so that assumptions about randomness of influence are more justified.

Most crucial, however, in any psychometric study, be it laboratory or field type, is motivation of the participant. The reward of a free sample is frequently insufficient to inspire a complete and reliable response. In the laboratory, the interest of the ob-



silent but prodigious workers!

somewhere in *your* process

enzymes will do it better . . . and faster

Whether you are processing products containing starches, proteins, pectins or glucose, there may be advantages in using these specific catalysts to:

Speed operations—control viscosity—enhance flavor and taste —improve storage stability and shelf-life.

diastases . . . for liquefaction and hydrolysis of starch to produce soluble dextrins and sugars—also, to remove starch causing filtration problems and turbidity. Produced from animal, fungal and bacterial sources to fit varying conditions of pH, time and temperature.

proteinases . . . for the modification and hydrolysis of proteins in food manufacturing and pharmaceutical operations.

glucose-oxidase . . . to prevent browning due to glucose or oxygen, and to increase shelf-life of beverage products.

pectic enzymes . . . for the hydrolysis of pectins in fruit and fruit juices to speed processing and to make fruit juices sparkling clear for consumer appeal.

Write our Technical Service Department for more detailed information on the use of Enzymes in your product.

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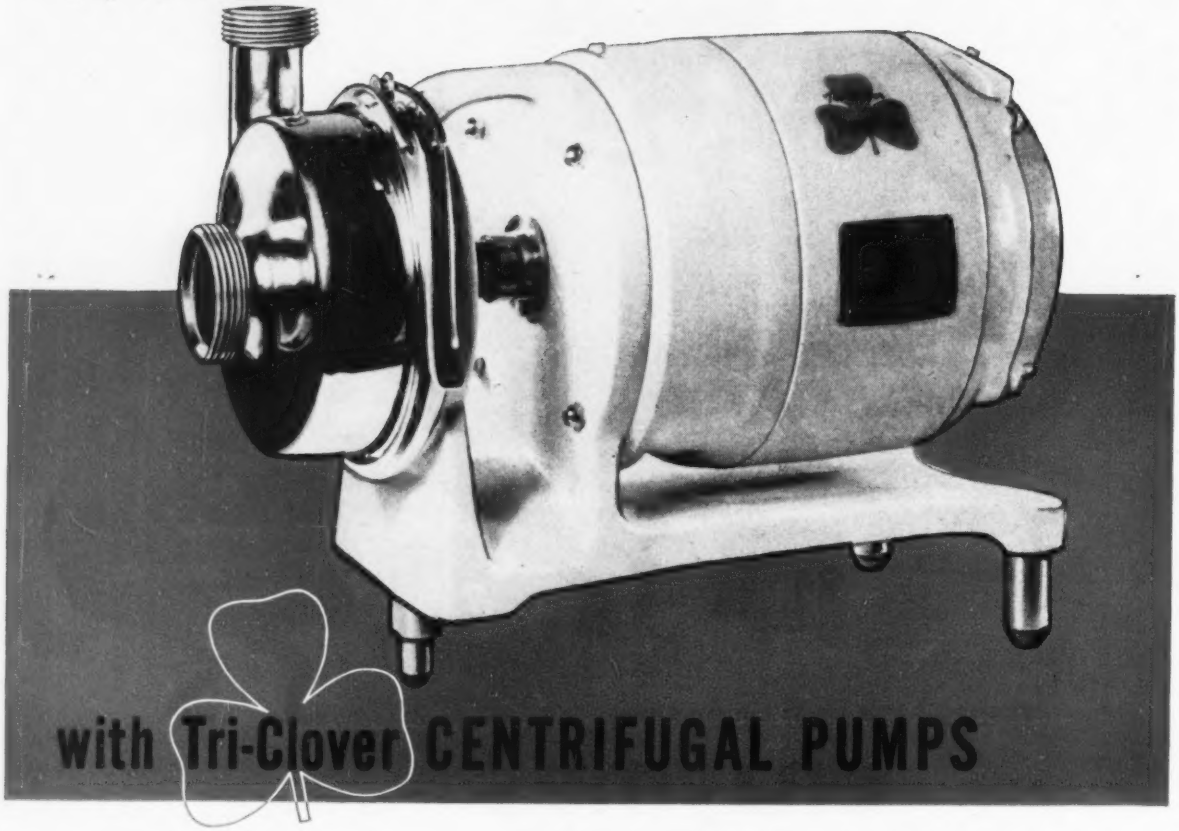
For more information, use coupon on page 177.

You Get More for Your Money



with Tri-Clover CENTRIFUGAL PUMPS

. . . and here are some of the reasons why: (1) *Wide choice of seal types, tested and proved for specific applications;* (2) *Design and manufacture that actually exceeds 3A sanitary standards;* (3) *Streamline heads—faster assembly and disassembly—easy to clean;* (4) *Patented impeller—higher efficiency—minimizes foaming action;* (5) *Pump heads can be turned full 360 degrees—simplifies installation.*

These are just a few of the advantages you get when you specify TRI-CLOVER Centrifugal Pumps. These modern, high efficiency units are backed by years of specialized experience, and are available in a full line of sanitary and industrial types to meet practically every corrosion-resistant pump requirement.

Let our experienced engineering staff help in solving your pumping problems.

Send for your copy of the all-new Tri-Clover Pump Catalog 253 . . . the most complete pump data book of its kind ever offered.

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FABRICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

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P254

server can be maintained and measured better than in the home.

Many different means of motivation are utilized in our laboratory, including subtle competitive devices. In one test the background information is slightly exaggerated, in another a judgment is forced, in still another a choice situation is arranged, and on occasion, actual purchasing of the same priced items is utilized. Danger is that a motivating circumstance may be inexpertly designed so that it operates counter to intention.

Instrumentation

It is frequently necessary to devise special instrumentation for measurement of psychological properties. Use of our 'colgetshedonoscope' (with which varying colors and configurations of packages are studied), a proportional odor mixer, and a tachistoscope (instrument that exposes color, figures, etc., for fractions of a second) have proven invaluable in obtaining objective and reproducible reactions. All three are adaptations of standard apparatus commonplace in university laboratories of experimental psychology.

Principle of the colgesthedonoscope can be applied to packaging problems when one wishes to change the color of label background or foreground independently.

The tachistoscope is designed to simplify and quantify study of package attention value, label, legibility, apparent size, and recognition potential of packages and other display materials. Packages are presented singly or in groups at any desired intensity of illumination for time intervals ranging from 1/100 sec. to several minutes.

The proportional odor mixer is used in analysis and design of odor formulations, testing of odor intensity, odor masking, and deodorization. Several odorant vapors can be mixed in the percentages desired by the simple expedient of valve manipulation. In conjunction with classification, the mixer is especially useful for difficult matching problems.

These instruments are representative of the working tools of the psychologist concerned with evaluation of the qualities and effectiveness of food products.

The instruments only assist him in precise control of physical and psychological environment of his trained observers and of consumers. Both environments are extremely important and must be controlled for psychological inquiry into the behavior of complex human beings—if any valid conclusions are to be drawn.

End (*Resume reading on page 60*)

"magic carpet"

TO UNIFORM PRODUCT QUALITY

The results may not show on your package label, but W&T Merchen Scale Feeders with continuous weigh-belt for weighing and feeding in one operation — can help to maintain uniform high quality in final product.

Precision scaled, durably constructed and simply controlled, W&T Merchen Scale Feeders deliver minute to minute accuracy whether feeding only a few or many thousands of pounds per hour. In modern food processing operations — premixing, batching and continuous blending — this exacting accuracy is a requisite. As further assurance of uniform quality, the Feeder may be synchronized with other equipment to shut-down automatically in the event of any equipment or supply failure.

If you have a food processing problem requiring uniform feeding and control — automatically by weight — communicate today with Wallace & Tiernan. Your inquiry will receive prompt attention without obligation.

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For more information, use coupon on page 177.

Is Contamination Sponging-up your Product's Flavor?

Airborne bacteria and mold cause contamination, which can rob your food products of their natural flavor. They also cause offensive odors . . . impairing flavor and saleability still further. Unchecked, these invisible enemies cost you money in scrapping, lost profits, and dissatisfied customers. Yet, many food processors have found a simple, complete solution in WESTINGHOUSE STERILAMPS.

Sterilamps produce germicidal ultraviolet rays that destroy bacteria and mold on contact. When necessary, they can also produce ozone that destroys odor . . . making the air clean and wholesome.

WESTINGHOUSE STERILAMPS are being used successfully in many industries where flavor-loss due to airborne bacteria and mold WAS a problem. In just a few minutes, you can find out how WESTINGHOUSE STERILAMPS fit your specific needs. Simply clip the coupon and mail it today.

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Useful New Books & Government Publications

Grain Storage Science

STORAGE OF CEREAL GRAINS AND THEIR PRODUCTS. *Edited by J. A. Anderson and A. W. Alcock. Published by American Assn of Cereal Chemists, University Farm, St. Paul 1, Minn. 1954. 515 pages 6x9 in., cloth. Price:* $11.00.

Directed at a timely problem—the spoilage of cereals despite phenomenal advances in cereal technology, this book is written by fifteen authorities in the cereal chemistry field. The first six chapters deal with moisture, chemical, and physical changes with time, microflora, respiration and heating, insects, and rodents. They provide the scientific background necessary for a full grasp of the problems.

The last five chapters cover areas in which practical experience is the chief source of knowledge. They cover grain storage facilities and their operation, grain drying, and cereal products themselves, particularly bulk flour storage and packaging.

Complete bibliographies follow each chapter. Book is illustrated and indexed.

Soybean Handbook Ready

SOYBEAN BLUE BOOK. *Published by American Soybean Assn., Hudson, Iowa. 1954. 160 pages. 6x9 in., paper. Price:* $3.00.

Up-to-date information on the soybean crop and industry is contained in this 1954 edition of a booklet valuable to soybean processors, oil refiners, and manufacturers using soy products in their operation. An added feature is a list and description of most soybean varieties now in production, with a map showing recommended varieties for particular areas.

Vegetable Oil Processing

VEGETABLE FATS AND OILS. *By E. W. Eckey. Published by Reinhold Publishing Corp., 330 West 42nd St., New York 36. 1954. 836 pages. 6½x9¼ in., cloth. Price:* $16.50.

This valuable new book offers an entirely new approach to its subject both in organization and in emphasis. All of the most important vegetable fats and oils are dealt with in detail and arranged in order of botanical relationships. Information is included on the plant from which each type of fat is derived, and the composition of the fat itself.

Though not complete, a great deal of data is included on the many methods of processing and using vegetable fats and oils. Chemists and other personnel engaged in the production or processing of fats and oils will find this book of great interest. Tables and charts, as well as references, provide an excellent guide for detailed study.

Taxonomy to Nutrition

SWEET CORN. *By Walter A. Huelson. Published by Interscience Publishers, 250 Fifth Ave., New York 1. 1954. 428 pages. 5⅞x8⅝ in., cloth. Price:* $10.50.

This monograph on a comparative newcomer to the food field, is the fourth in a series on economic crops. A thorough and comprehensive discussion of the capabilities and problems of the new vegetable, the book is designed to assemble and evaluate all available information from taxonomy and morphology to quality and nutritive value.

Quoting statistics as late as 1953, the work should serve as an aid to bridging the gap between the producer and the processor, providing both with a more complete understanding of what corn production and processing involves.

Management Text

INTRODUCTION TO INDUSTRIAL MANAGEMENT. *Fourth Edition. By Franklin E. Folts. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 36. 1954. 684 pages. 6¼x9¼ in., cloth. Price:* $6.50.

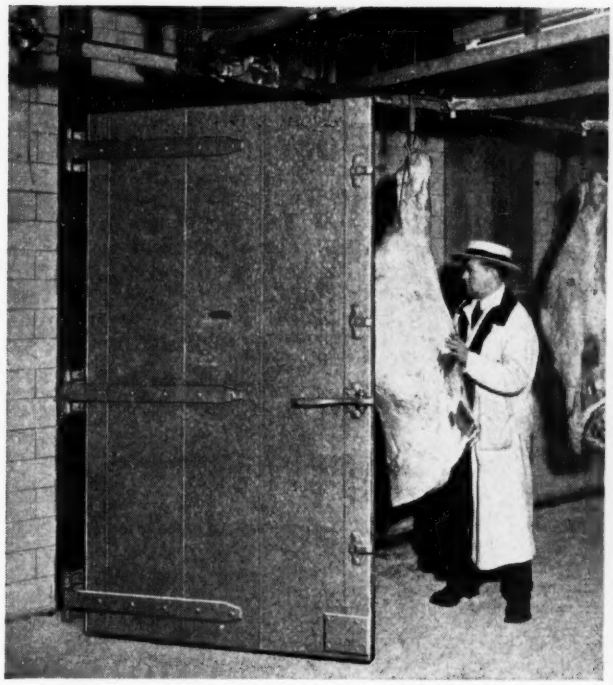
A complete revision of an earlier work, this book is designed as a text for students, but may serve as a guide for those in management positions. Dealing with practical business and economic conditions rather than theory, the author places special emphasis on the importance of the ability to analyze rather than memorize.

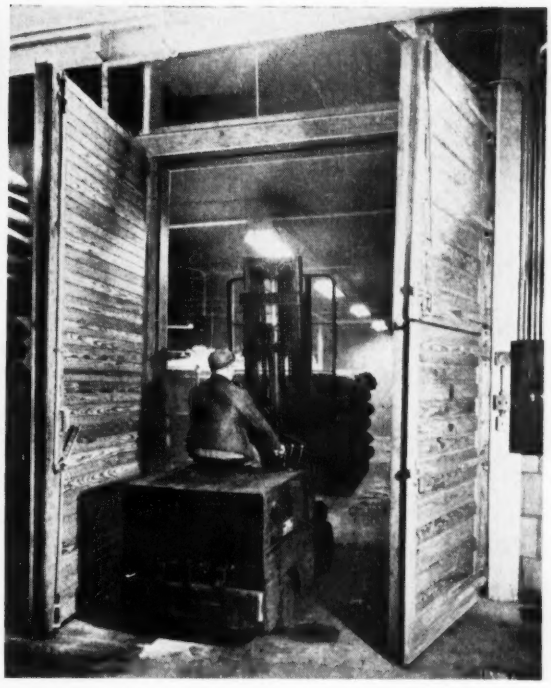
Book is illustrated and indexed.

Technology of Bananas

BANANAS. *By H. W. Von Loesecke. Second Edition Published by Interscience Publishers, Inc., 250 Fifth Ave., New York 1. 1950. 201 pages. 5½x8½ in., cloth. Price:* $6.00

A presentation of the chemical composition, biochemical and physiological behavior, botanical aspects, and production factors of bananas, this work is of value to both food processors and those engaged in actual





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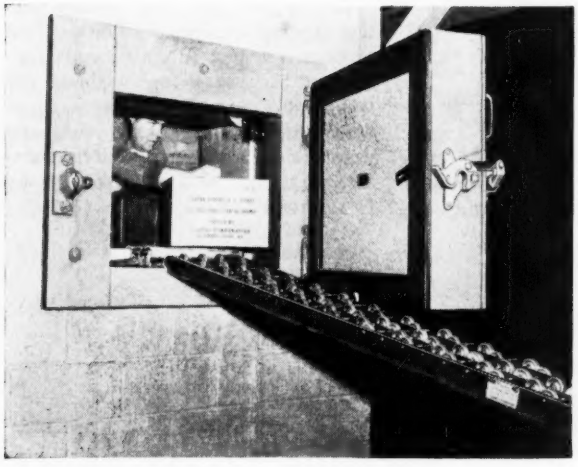

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production of the fruit. Neither group I

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It's amazing, almost to the point of fantasy, yet so soundly real, what the minds of men in all types of industry have cooked up for more efficiency and reduced costs with the Dempster-Dumpster.

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production of the fruit. Neither group is neglected in the treatment given the subject, though chemical composition, and biochemical and physiological behavior of bananas are the central themes.

Not written for the specialist, the book is designed to provide an over-all picture to those whose work brings them into contact with the industry. Book is illustrated with photographs and tables, and is indexed for ready reference.

Progress of Lipids

PROGRESS IN THE CHEMISTRY OF FATS AND OTHER LIPIDS *Volume II. Edited by R. T. Holman, W. O. Lundberg, T. Malkin. Published by Academic Press Inc., 125 E. 23d St., New York 10. 1954. 347 pages. 6½x9¾ in., cloth. Price:* $9.80.

Written by one of the foremost authorities in the field of lipid chemistry, this work is designed to meet a need for presentation of recent advances in the area of investigation. The second in a series, it includes chapters on the polymorphism of glycerides, autoxidation of lipids, nutritional significance, surface properties, urea inclusion compounds of fatty acids, infrared absorption spectroscopy in fats and oils, and counter-current fractionaries of lipids.

Indexed by name and by subject, the book is illustrated with tables and charts.

New Enzyme Treatment

INTRODUCTION TO THE CHEMISTRY OF ENZYMES. *By Keith J. Laidler. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York, 36. 1954. 208 pages. 9¼x6¼ in., cloth. Price:* $5.00.

A simple, but thorough treatment of enzyme chemistry, this book is written primarily for biochemistry students. Keeping in mind the needs of the biologist and physical chemist, the author has treated the subject from a mechanistic point of view. New material covering the kinetics and mechanism of enzyme action and the structure of enzymes in their active and denatured forms, is a feature of the work.

Illustrated with charts and tables, the book is indexed for quick reference.

Manual for Packagers

PACKAGE ENGINEERING HANDBOOK. *By Walter Stern. Published by Board Products Publishing Co., 228 N. La Salle St., Chicago 1. 1954. 320 pages. 8¾x10¾ in., cloth. Price:* $10.00.

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DIASTATIC ENZYMES?

If you make breakfast cereals, sweet syrups, grain neutral spirits, or other cereal-derived products, RHOZYME diastatic enzymes can offer you many processing advantages.

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CAPACITIES: ¾ TO 6 TONS

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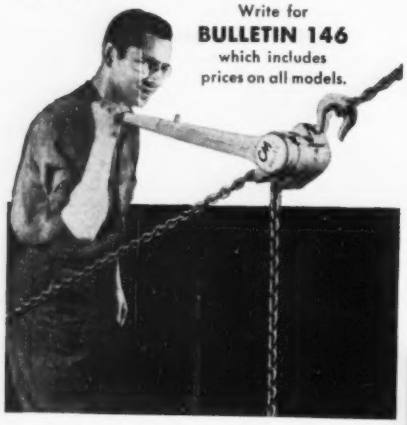
Write for **BULLETIN 146** which includes prices on all models.



ANYONE CAN OPERATE and every plant should have several of these inexpensive CM PULLERS handy for the general maintenance crews.

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to both the large and small shipper, this book is designed to help reduce costs, improve methods, and reduce heavy transportation and handling damage.

Chapters include information on specifications, quality control, tools of package engineering, organization and functioning of package engineering departments. Nineteen basic reference tables are included, along with over 300 reference sources. Book is illustrated and indexed.

Government Publications

BUILDING DESIGNS FOR DAIRY PROCESSING PLANTS. *University of Idaho, Agricultural Experiment Station Bulletin No. 297, Moscow, Idaho (cooperative study with USDA and California, Montana, Oregon, Utah, and Washington Agricultural Experiment Stations)*, 27 pages. Discusses various building problems giving operational difficulties and presents charts and tables to aid selection of materials of construction; cost estimates included for model plants based on 1952 prices.

PREPACKAGING THOMPSON SEEDLESS GRAPES IN CELLOPHANE BAGS IN RETAIL STORES. *Production & Marketing Admin., USDA.* 8 pages. Results of studies conducted by USDA, Fruit & Vegetable branch, and The United Fruit and Vegetable Association on sales of Thompson Seedless Grapes in bulk form versus prepacked cellophane bags. Office of Information Services, PMA, USDA, Washington 25.

These recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated, the pamphlet is free and should be ordered directly from the Bureau responsible for its issue.

VEGETABLES FOR COMMERCIAL PROCESSING: ACREAGE, PRODUCTION, VALUE; REVISED ESTIMATES, 1918-50, BY STATES. *USDA, Statistical Bulletin No. 132, 108 pages.* 30 cents. Consolidates under one cover estimates formerly available in scattered publications; revised on basis of 1950 Census of Agriculture.

OPERATING COSTS OF SELECTED FROZEN FOOD LOCKER COOPERATIVES. *USDA, Farm Credit Administration Bulletin 71, 59 pages.* 20 cents. Based on study of seven frozen food locker plants in the Midwest; compares costs with rates charged, and draws limited conclusions.

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Insist on CHASE BAGS

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CHASE POLYTEX (PLASTIC) BAGS

Showcases your product

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For products requiring maximum protection in transit *plus* moisture resistance. Also available with polyethylene liner.

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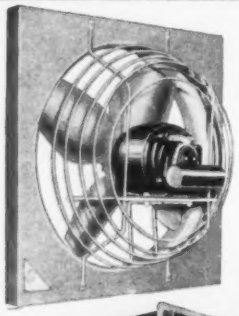
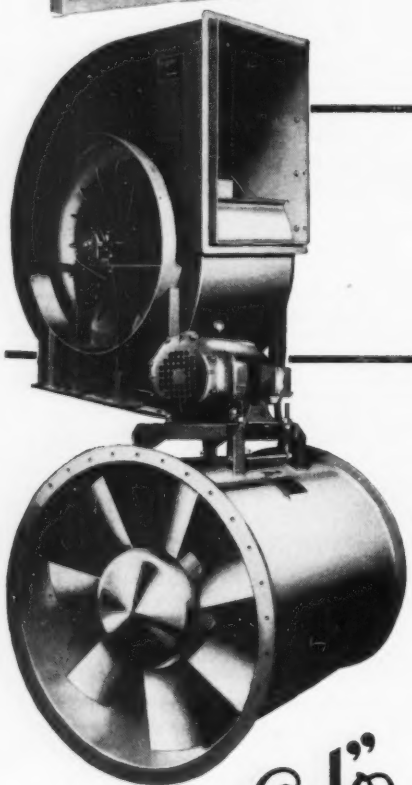
"Here's My Problem"

CUSTOMER:
First, one of our older buildings has areas which need spot ventilation. Then, in another building, we're going to need large-capacity exhaust to get rid of dust and moisture. Finally, we need additional capacity in an old system where we've just installed some air cleaning equipment. Now, my problem is . . .



Which "Buffalo" Fan Shall I Use?

BUFFALO REPRESENTATIVE: "To begin with, no single type of fan is the best solution to *all* problems. The best and cheapest answer to your spot ventilation, for instance, is the new Type "NV" Breezo Fan. An efficient propeller fan with strong, rigid, die-formed square panel, the "NV" is simple to install in outside walls wherever you need to exhaust stale air. It can be operated free-air or duct-connected (¼" to ½" s.p.) equally well. The "NV" is made in sizes for 500 to 5500, cfm capacities, and if you need larger capacity, use the new "NV" Heavy-Duty Belt-Air, it's in sizes up to 90,000 cfm. Write for Bulletins 3865 and F-3790.



"Now, for your large-capacity exhaust system, you'll get greatest long-run satisfaction and economy with the new Type "BL" Limit-Load centrifugal fan. It's the type recommended most frequently for large systems —straight ventilation, air washer and air conditioning supply. You can't overload it, and it gives stable performance from shut-off to free air delivery. And you can pick exactly the rated capacity you need, from 1000 to 500,000 cfm, with no waste in an oversize fan or over-specified driving power. Write for Bulletin F-100.

"But where you need to step up the capacity of a system, mount an axial flow fan in a straight portion of your ductwork. The "Buffalo" Axial Flow is light, compact and takes little more space than your duct. It's extremely efficient in straight runs, and has guide vanes to keep turbulence and noise at a minimum. So you see, there is no *one* fan for all jobs. At Buffalo, we make all types and sizes, so that you can pick one that's practically tailored to your particular need. We've been building fans for 77 years, too, which means that you can be sure of any "Buffalo" fans you pick." Write for Bulletin 3533-C.

SUGGESTION: Most important of all, remember that Buffalo Engineering Sales Representatives are all technical graduates, factory trained for a number of years; they know fans and their application. Located in all principal cities, they are ready to assist you, too, in fan selection. Why not call on yours today?

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KEEPING UP WITH THE FIELD

Technical News • Washington Highlights • Economic Trends • Labor Developments

Vitamins and Metabolism

An informal lecture-and-discussion conference on vitamins and metabolism is scheduled Aug. 16-20 at Colby Junior College, New London, N. H.

Under sponsorship of the Gordon Research Conferences, American Assn. for the Advancement of Science, the program has the prime purpose of giving experts free rein to analyze latest developments and their significance, while inviting suggestions as to underlying theories and profitable approaches for new progress.

Since attendance is limited, those interested should immediately address W. George Parks, director, Department of Chemistry, University of Rhode Island, Kingston, R. I. Institution or company connection should be stated and type of work in which interested.

Tokyo 'Radiating' Fish

Employing cobalt-60 of 21-Curie strength, scientists of Tokyo Marine University are exploring possibilities of radiation sterilization of seafood.

In experiments, sliced fish cakes first are wrapped in polyethylene, then with tinfoil, whereupon they are exposed to the gamma rays for 45 hr. at a distance of 15 cm. The foil provides a secondary radiation of beta rays supplementing the low cobalt radiation. So sterilized, the cakes have kept two weeks without refrigeration.

Prof. Ikunosuke Okada, who is directing the work, foresees practical results using 1,000,000-Curie strength cobalt-60, which must be obtained from the U. S. Atomic Energy Commission.—*McGraw-Hill World News.*

Re Pesticide, Additive Bills

The Miller Pesticide Bill, which passed the House without objection, won't come up for Senate hearings before the latter part of this month.

The Senate Labor Committee, to which it has been referred, has a pretty full schedule for the next few weeks. But Washington observers see little doubt that the measure will become law this session.

As for the status on food additives, there now is no chance of a quick compromise. It is virtually sure that almost every one of the interested food and chemical industry groups will introduce individual bills.

What's New and What's Coming On Faster Packaging Lines

Radical changes are foreseen in the packaging field through the strong trend toward speedier lines.

This was emphasized by John A. Warren, packaging consultant of American Home Products Corp., and American Management Assn. vice-president in charge of the Packaging Division, N. Y. C., in a pointed progress talk at the recent AMA Packaging Show in Atlantic City.

Cans: Currently, said Mr. Warren, strides are being made by steel mills in continuous annealing of steel strip in an effort to make lighter gages. Tinplate mills are producing differentially-coating electrolytic tin plate (different weights of tin on either side). Further, can makers are putting into use new organic coating components and side-seam cements in their move toward a tinless can.

Glass: Manufacturers are searching out mist-spray coatings that (1) will avoid scratching of containers, and (2) will not affect label adhesion. Predicted is better control in the making of glassware, resulting in closer adherence to "specs."

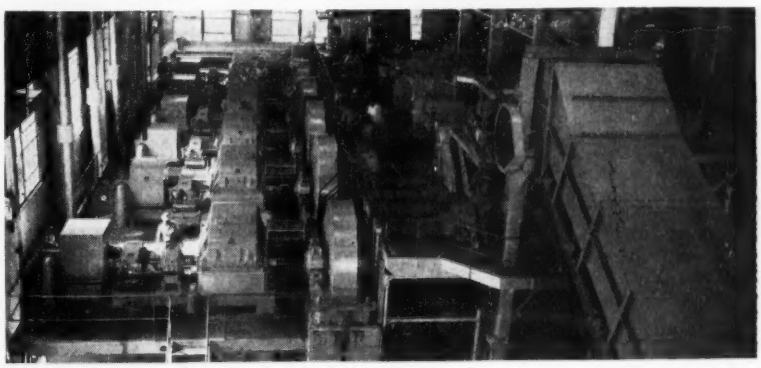
Film: Producers, Mr. Warren cautioned, must carry out more research on the handling and machinability of their materials. And the machine designer must design his equipment to handle available films, despite their shortcomings.

Polyethylene uses will grow, he forecast. But there's room for improvement in transparency, machinability, and printing quality. Better low-temperature-holding saran should find a niche in gas- and vacuum-packing. But big problem is control of sealing of saran on high-speed machines. Mylar is arousing great interest.

Aluminum: Cans of aluminum will not be competitive with tin cans, he declared, until price differential between aluminum ingots and sheet more nearly parallels that between steel ingots and electrolytic tin plate.

Fiberboard: Containers with aluminum-foil liners, plus the vacuum-cooling technique, are seen replacing other produce-packing units. Granular and viscous products now are being shipped in cases lined with paper and plastic bags. There's a new solid-pulp-filled, remarkably resilient corrugated material that does not flatten under pressure.

New machine developments, he went on, are permitting solid-box carton makers to attain continuous pro-



All-Turbine-Drive Cane Crushing Plant

Just completed by Kekaha Sugar Co., Hawaii, this new million-dollar crushing facility has rated capacity of 125 tons of cane per hour with accommodation for summer weekly peaks of 150 tons. This compares with 73 and 85-ton performance of old plant.

Featured are centralized and pressurized lubrication and remote electrical control of all operations. Battery of 17 roll-crushers is driven by six 450-hp. multi-stage turbines operating on 415-psig. 760-deg.-F. steam and exhausting at 15 psig. back pressure.

Turbine speed ranges 3,000-5,900 rpm. Roller surfaces run 30 to 59 fpm., giving versatile grinding velocities and high capacity for better recovery of sucrose.

IFT Shapes Top Tech-Paper Program

Well over 180 papers—many delving into new categories—will feature the technical programs at the annual meeting of the Institute of Food Technologists, June 27 to 30 in Los Angeles.

New note, for example, will be the special session on marketing. Here, business opportunities in promotional, advertising, and evaluation spheres will be highlighted, with subject matter shaped to suggest applications for the technologist concerned both with existing and new food-field products.

A specific session will concern wine stability, covering such influences as nitrogen content of must, pH and total acidity, enzyme introduced as a stabilizer, and sulphur-dioxide. Several papers relating to poultry, eggs, and milk, respectively, also will be presented. And among other contributions will be paper on acetoglycerides—new fat products of potential value for the food industry.

Still other topics will be: Consumer testing, food and drug laws, packaging, pectins (in a "pectin round table), fruit and vegetable problems, frozen-food factors, irradiation sterilization, citrus concentrates, instrumentation, chemicals (pesticides, etc.), role of fats in diets, antibiotics in nutrition, food stabilization, fish and meat research, and also special purpose foods, such as for children and the aged, as well as medical diets.

A special session will be a food engineering roundup treating the integration of food engineering with food technology and food science.

duction. This will make for lower-cost, more uniform set-up boxes.

More automatic controls are going on paperboard-making machines to turn out boards of more uniform weight and caliper. Finer printing surfaces of patent- and clay-coated boards will bring new strides in decorated cartons. To meet high tear and tensile requirements, a sheet with kraft or kraft-scrap 'findings' in the finish is being produced.

Foil-laminated board with moisture-proof and greaseproof properties now is serving as a package for heat-processed products. Activity is brisk in the use of hot melts for protective coatings and high gloss decorative effect of cartons.

Resin coatings: These should widen uses of collapsible metal tubes.

Coming up: Mr. Warren also cited a number of on-the-way developments in the packaging-machine sphere. Being tried out is a new rotary-type premeasure liquid filler. Hydraulic torque controls are going into automatic cappers. Now on trial is a new high-speed, straight-line capper.

There will come within six months, he declared, two new simple, semi-automatic cartoners, as well as an automatic one for handling either tuck or glue-type cartons. Also, there is now in the make-up stage a new high-speed unit for turning out individual packets. Two firms are developing machines to pack cartons with either cellophane or kraft paper.

Career-Promoting Placard

High schoolers in the Chicago area are the "sales targets" of this potent poster turned out by Kraft Foods' research department. It's aimed to arouse interest of up-and-coming generation in food-engineering careers.

Swiftly Clarifies Wine

A new product—Kieselsol—is said to be superior to tannin as a clarifying agent for wines and fruit juices. It has been introduced by Badische Anilin & Soda-Fabrik A. G., of Ludwigshafen, Germany.

Employed in conjunction with gelatin, Kieselsol, a 15% solution of colloidal silicic acid, produces a jelly-like precipitate that absorbs plant albumin and suspended particles.—*McGraw-Hill World News.*

QM Now Emphasizing Radiation Sterilization

Army Quartermaster Corps, following about five years of small-scale experimentation, now has gone into high gear on investigation of radiation sterilization of food.

It foresees that the $5 million research program will take another five years to complete, though it certainly expects some specific tangible results before that target date.

Quartermaster Food & Container Institute at Chicago—where all research is being done—will use both particle accelerators and radioactive materials, such as concentrated fission products, in its research.

QM scientists are planning to test sterilization of all types of perishable foods bought for Army use. Undoubtedly, though, the most pressing problem will concern the specific matter of meat preservation.

Packaging Executives Seen in Top Echelon

"Expect packaging executives to be on the top-management team in the next decade."

This was the prediction of J. C. Coffee, Management Development Assoc., N.Y.C., speaking at the opening session of the recent AMA Packaging Conference convened in Atlantic City.

Top management in mass-distribution fields will, said Mr. Coffee, increasingly call upon men who have had packaging experience. It will, however, take exceeding skill, judgment—and hard work—on the part of the man developing himself for a top job and on the part of those developing him.

Management development is no longer something new, he pointed out. Here, some of the major tools are: Identification of present strengths and weaknesses, improvement of reading speed and comprehension, emphasis on emotional stability, training in general semantics, techniques of evaluation, problem identification and solution, planning and control techniques, personal goals, job objectives, attitudes, "road blocks," report preparation, principles of organization and personal specifications.

Pins Down Milk Surplus

Heavier feeding of cows has increased yield of milk about 13% in Northeast milksheds since 1945—and it is largely responsible for the present surplus problem in that area.

So stated Dr. Leland Spencer, professor of milk marketing, at Cornell University's recent Farm & Home Week Forum.

Other contributing factors cited: (1) A shift in affiliation of producers from one market to another; (2) decreased farm use and overall reduction in per capita consumption; and (3) approval of additional farms for city milk supply.

Nose-Appeal Wrappers

Introduction of the odor of freshly baked bread into waxed paper used for bread packaging has been announced by Specialty Papers Co., Dayton. The process is aimed to aid merchandising abilities of waxed paper.

Further, a chocolate-odor wrapper is planned for chocolate cakes.

Hors d'Oeuvres

▶ Toppa Holdings, Ltd., will promote frozen confections in Australia with the aid of Walt Disney characters. If Mickey Mouse could cut his internationally loved capers behind the Iron Curtain, he might laugh the Russians into being less ridiculous.

▶ Armour and Company is sponsoring two pint-size companies manned and managed by youngsters. This Junior Achievement activity is a school of free enterprise. And we challenge Malenkov's ability to arouse the interest of a single "graduate."

▶ Pomace from wineries may be used to thicken oil-well drilling fluids to seal cracks in the drill holes. Ought to step up the octane, too.

▶ The history of corn on this continent has been traced back 60,000 years. The first North American man probably cut his teeth on a cob.

▶ Popping corn now is packaged in crinkled aluminum foil with a paper pull-out handle. Hold the package over the fire and the corn pops inside it, the package expanding as the volume increases. Such ingenuity surely will be rewarded.

▶ Research executives have moved into the policy-making stratum of corporate management. Companies now want to know where they are going, not just where they have been.

▶ Payrolls of California food manufacturers increased 48.5% from 1947 to 1953—the success of Florida citrus concentrates notwithstanding.

▶ Now comes the single-service rat trap, from Shaw-Randall Co., Pawtucket, R. I. It is a red plastic tube, 5¼ in. long with a 1¾-in. diameter. One end is closed, the other having a one-way split-cone door which pushes apart as the rat goes inside for the bait. Presto, you have an individually packaged dead rat. No doubt, the proverbial path will be beaten.

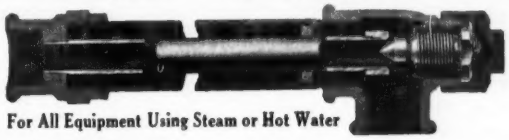
▶ A dish of old-fashioned cereal with half-and-half (cream and milk) and sugar contains 246 calories, of which 42% is in the cereal. But of the 304 calories in a modern puffed-cereal dish, only 17% is in the cereal, 72% in the half-and-half. Seems the cereal boys have been puffing the dairy business.

Another Large Firm Adopts

$35 NICHOLSON TRAPS AS TEMPERATURE CONTROLS

Because they serve effectively as temperature controls as well as steam traps, and cost only about $35, Nicholson expansion steam traps are being increasingly installed in place of temperature regulators. A large processor recently installed these Nicholson units on outdoor storage tanks after thorough tests showed a less than 2°F variation in outlet condensate temperature. Regulators had been costing them $110.00 to $200.00, with cost of a trap added.

Nicholson expansion steam traps are easily adjusted to pass condensate at any temperature below 212°F. Because there is only one moving part, remarkably low maintenance costs are being shown. Easily installed, usually without supports. Lengths, 9" to 40". Pres. 0 to 250 lbs. Freezeproof.



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How a Cyclone Belt helps convert waste materials into cattle meal base

● A Pacific coast machinery designer specified a Cyclone Conveyor Belt for his new dehydrating process that makes food for cattle out of waste materials from the nut and canning industries. Today much of the refuse from these industries can be utilized to produce a meal base for cattle feed. It's done on a Cyclone Equalized Spiral Belt.

You can depend upon a Cyclone Belt to help you by increasing output, by speeding production, by cutting production costs. It's certainly worth investigating. Our engineers will be glad to give you more information, without obligation. And write Dept. H-54 for your free copy of Catalog 85.

USS CYCLONE

METAL CONVEYOR BELTS

CYCLONE FENCE DEPARTMENT

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL CORPORATION

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Get more production from your present processing equipment. Increase capacity by eliminating space-wasting foam with Dow Corning silicone defoamers. Here are some typical examples:

- ✔ standard molasses processing load increased from 18 to 24 tons!
- ✔ yield on textile vat dyes doubled!
- ✔ in processing food, vacuum concentration capacity increased 60%!
- ✔ proposed $2,000,000 expansion of processing plant made unnecessary by efficient foam control!

Dow Corning Antifoam A Compound and Antifoam AF Emulsion are the most versatile and economical defoamers on the market. Effective at remarkably low concentrations, they pay for themselves time and again in more complete use of process equipment and shorter processing time, and in the elimination of waste and fire hazards. Both defoamers are tasteless, odorless and physiologically harmless.

For more efficient foam control . . .

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Mellorine Sales Tangle

Legal question of whether sale of imitation and real ice cream can be made in the same stores in California is expected to go to the state's highest court for a final determination as a result of recent differences in lower-court opinions.

A Los Angeles County superior court judge, Alfred J. Bartlett, now has ruled the two products can be sold in the same stores. He upheld the contention of supermarkets and wholesalers in Southern California that the state department of agriculture's edict against it, issued last June, was "arbitrary, discriminatory and illegal."

Earlier, a superior court judge in Sacramento County granted the state department of agriculture's request for an injunction to prevent Irv J. Blake, imitation ice cream manufacturer in Sacramento, from selling both products in his establishment (Feb. FE, p. 197).

Big Outlays by Dairies

Encouraged by such factors as improved food habits, population growth, high level of savings, and stimulating effect of tax reductions on consumer buying, the country's two largest dairy companies plan big outlays for improvements this year.

National Dairy Products Corp. has appropriated $36,000,000 for new plants, improvements, and replacements, representing the largest capital expenditure in its history.

Further The Borden Co. plans to spend more than $18,000,000 on a broad development program.

Armour Modernizing

A two-year $10 million program to streamline Armour and Company's Chicago Stockyards operations is announced. It will see the present diverse layout of 121 buildings spread over 23 city blocks reduced by 50 buildings encompassed in 11 blocks.

Thus, a much more compact working layout will be achieved.

"This move is a shrinking of obsolescence rather than of operations," declares President F. W. Specht. Particularly, the changes will permit relocation and improvements in the important hog processing, which has been plagued by inefficiencies of excessive handling over a wide area.

Reefer-Trailer Ideas

Innovations in design of refrigerated truck-trailers mark the recent order placed by Pacific Intermountain Express for 106 carriers to be used on its California-Midwest runs.

Ceiling of each trailer will incorporate a system of five air ducts to carry cold air from a Thermo-King unit to all sections.

For optimum cooling there will be four registers in every duct. Further, the carriers will include meat rails and hooks, such as employed in packing houses, to permit easy handling of large carcasses.

This latter equipment will be retractable when not in use.

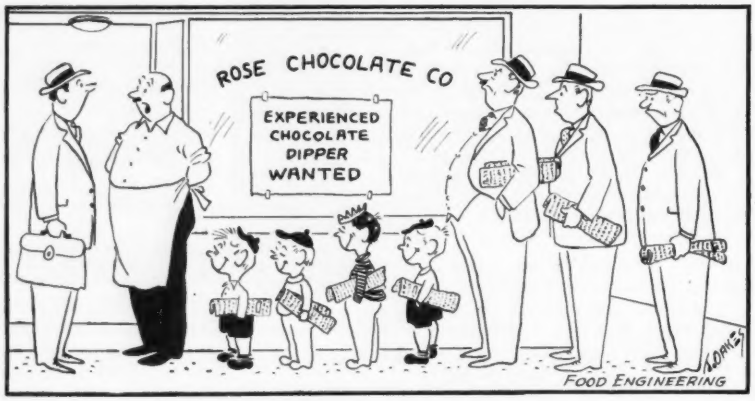
Dielectric-Infra Oven

Recently demonstrated in Switzerland was a new combination high-frequency infra-red baking oven. First of the double-action units is being taken by J. Lyons & Co., Ltd., London tea firm and restaurant operator.

The dielectric HF baking is stated to take but 2-3 min. for cookies or biscuits and 19-22 min. for 2-lb. loaves of bread.

A fine bread crust reportedly is attained by the simultaneous infra-red exposure.

Maker of machine is Reforma S.A., of Muttenz, Switzerland.—*McGraw-Hill World News.*



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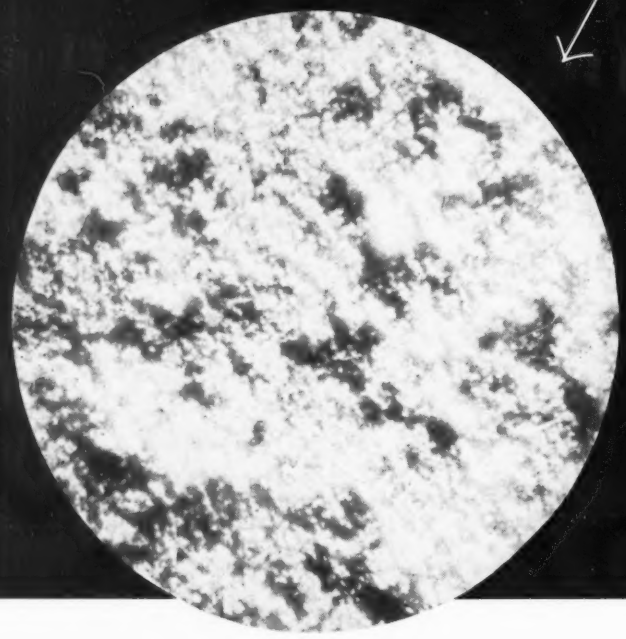

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Edwin John Cameron

Gets Babcock-Hart Honors

For 1954, the Babcock-Hart Award of the Institute of Food Technologists will go to Edwin John Cameron. Presentation is scheduled at a luncheon June 29 during the annual IFT meeting, to be held in Los Angeles, June 27-July 1.

Dr. Cameron is director of the Washington Research Laboratories of the National Canners Assn. He joined NCA in '23, assumed charge of bacteriological work in Washington in '27, was appointed assistant director of the laboratory in '36, and since '39 has been its director.

Thus long identified with canning research and technology, his direct contributions have been numerous. Particularly cited is his launching of canning-plant bacteriological surveys that have been vital in prevention of spoilage. Further, Dr. Cameron has been notably active in many nutrition improvements.

Established in '48 in tribute to Stephen M. Babcock, the award now has been expanded to honor, as well, Edwin Bret Hart, colleague of Dr. Babcock. It carries a $1,000 honorarium made possible through a grant by the Nutrition Foundation, Inc.

Study Meat-Drip Losses

Tendency for thawed muscles to drip (lose meat juices) may be attributed to acidity and calcium-magnesium levels in the frozen meat muscle. This has been indicated by investigations of the Division of Food Preservation of the Australian Commonwealth Scientific & Industrial Research Organization.

The work is being directed to control drip through animal feeding and exercising, or by drug injection.

It further appears that freezing muscle tissue before it passes through rigor aggravates formation of drip on thawing. On the other hand, holding frozen carcasses just below freezing and prior to thawing would likely offset this adverse change.—*McGraw-Hill World News.*

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EXTRA

Announcing new food-grade dbpc® antioxidant

Briefly . . .

● RESEARCH grants totaling $250,000 are announced for '54 by Swift & Company. Tendered to schools and institutions, awards further program launched in '41. To date, some 240 separate scientific projects have been supported by company.

● **USDA BUTTER going to industry for use as cocoa-butter extender now totals 300,000 lb., with word that 30,000-lb. lot has just been taken by Deran Confectionery Co., Cambridge, Mass. Meanwhile, USDA invites offers to convert another 1,150,000 lb. into butter oil for human food in Middle East under UN program.**

● FROZEN-FOOD fruit-and-vegetable pack turned out in California in '53 surpassed 426 million pounds—a 26% climb over '52. Respectively, fruit pack was a record 143,668,492 lb. (up 52%) and vegetable pack 282,345,302 lb. (up 16%).

● **"ATOMS FOR PEACE" is keynote of Nuclear Engineering Congress slated June 20-25 at U. of Michigan, Ann Arbor. Food industry factors will be on agenda. Sponsor is Nuclear Engineering Div. of American Institute of Chemical Engineers, and chairman is C. M. Sliepcevich (3030 Backham Bldg., Ann Arbor).**

● PACKAGING AND HANDLING problems will be considered in a special industrial seminar to be introduced at 5th Western Packaging & Materials Handling Exposition, scheduled for San Francisco's Civic Auditorium, Aug. 17-19. Long-range administrative and engineering methods, as well as cost cutting and operating efficiency, will be stressed.

USDA & FDA Standards

Recent actions by USDA's Agricultural Marketing Service and FDA include following:

Barley, revisions proposed, p. 1488, Mar. 18 *Federal Register*.

Frozen strawberries, revisions proposed Jan. 28 will not be issued at this time, p. 1651, Mar. 26 *Federal Register*.

Green asparagus, revisions proposed Jan. 20 will not be issued at this time, p. 1669, Mar. 27 *Federal Register*.

Dehydrated apples, proposed, p. 1669, Mar. 27 *Federal Register*, p. 1932, Apr. 6 *Federal Register*.

Butter, revised, effective Apr. 1, p. 1693, Mar. 30 *Federal Register*.

Cucumber pickles, revised, effective Apr. 29, p. 1695, Mar. 30 *Federal Register*.

Canned peas, deadline for submission of comments on revisions proposed Jan. 1 extended to Feb. 1, 1955, p. 1910, Apr. 3 *Federal Register*.

Imported crabmeat, FDA policy statement on labeling, p. 2013, Apr. 8 *Federal Register*.

Tomato sauce, p. 2061, Apr. 9 *Federal Register*.

Fresh carrots, revisions proposed, p. 2063, Apr. 9 *Federal Register*.

Wintergreen oil (methyl salicylate), FDA policy statement on product labelling, p. 2085, Apr. 10 *Federal Register*.

Bunched radishes, proposed revision, p. 2128, Apr. 13 *Federal Register*.

Frozen apples, revised, effective May 17, p. 2157, Apr. 15 *Federal Register*.

Green corn, revised, effective May 18, Apr. 17 *Federal Register*.

Dry whey, proposed revision, Apr. 17 *Federal Register*.

Flowsheet Correction

In drawing of separating-building section of "Edible Oil Processing," Picture-Flowsheet No. 63 (Mar. FE, p. 140-143), two types of centrifuges erroneously were interchanged. Disk centrifuges depicted in soapstock line actually are in water-wash line, and twin Super-Centrifuges shown in latter line belong in soapstock line. While disk units are not recommended for primary refining, twin Supers are highly efficient for it. Also, addition of wash water is not so accurate that proportioning control is needed. Water proportioning is carried out by a simple rotameter control.—*The Editors*.

Schedule of Events

May

16–19—U. S. Wholesale Grocers' Assn., convention-exhibit; St. Louis.
16–19—Flavoring Extract Manufacturers' Assn. of U. S., annual convention; Hotel Biltmore, New York City.
16–19—American Institute of Chemical Engineers, spring national meeting; Kimball Hotel, Springfield, Mass.
17–19—Grocery Manufacturers of America, mid-year meeting; Boca Raton Hotel, Boca Raton, Fla.
17–19—Millers National Federation; Edgewater Beach Hotel, Chicago.
23–27—American Assn. of Cereal Chemists, annual meeting; Cosmopolitan Hotel, Denver, Colo.
23–27—Assn. of Operative Millers, technical conference; Hotel Sherman, Chicago.
26–29—Canadian Wholesale Grocers' Assn.; Quebec.
30–J6—International Congress of Agricultural & Food Industries; Madrid, Spain.

June

9–11—Processed Apples Institute, spring meeting; Skytop, Pa.
12–15—New England Bakers Assn.; Poland Spring, Me.
17–18—Bakery Equipment Manufacturers Assn.; Cavalier Hotel, Virginia Beach, Va.
20–25—Nuclear Engineering Congress, University of Michigan, Ann Arbor.
22–24—American Dairy Science Assn., annual meeting; Pennsylvania State University, State College, Pa.
27–J1—Institute of Food Technologists, annual meeting and exhibit; Hotel Biltmore, Los Angeles.

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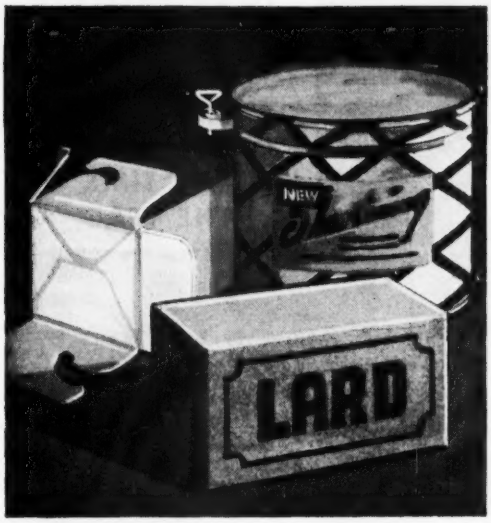
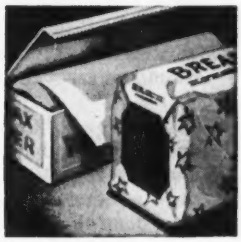
new, lower cost food grade dbpc® antioxidant

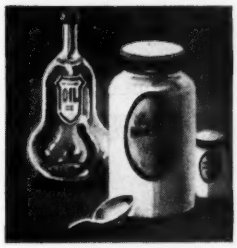


In lard and shortening

In fats and fried foods



In waxed paper



In dressing and salad oil

In nuts and canned meat

In baked goods

MANY food products are susceptible to deterioration through oxidation, especially those containing fats and oils, such as lard, shortening, and other cooking agents. Spoilage due to oxidation may occur during manufacture or afterwards, manifesting itself as a change of texture, color, odor, or flavor. The result is unnecessary waste — of money, time, and product.

Stability of food color and odor may be increased, however, by the addition of **dbpc** (di-tertiary-butyl-para-cresol, known also as butylated hydroxy toluene) antioxidant to the product during manufacture. **dbpc** gives better protection at lower cost—effectively inhibits deterioration and reduces waste.

Many foods and products used in connection with foods, such as waxed paper, meat casing, coated paper board, etc., will find dependable protection in **dbpc** oxidation inhibitor—at *lower* cost.

For further details concerning dbpc food grade antioxidant, write:

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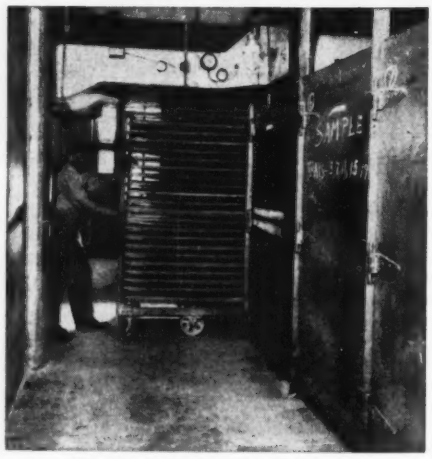

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Niagara District Engineers in Principal Cities of U. S. and Canada

Potato Peeling Spurts

—Continued from page 93

graded potatoes, since this alert firm has devised a simple, yet efficient, in-process grading system.

Conditioning potatoes a week or so at about 70 deg. F. in the plant is still another quality-control measure carried out prior to actual processing. Purpose is to maintain a desirable starch-to-sugar ratio. Too much reducing sugar in cold-stored spuds, for example, results in unsatisfactory potatoes for French frying.

Here's how spuds are continuously peeled under close technical supervision on this advanced-performance line:

Built Own Washer, Peeler

Hauled from a 2,000-bag (100 lb.) holding room, potatoes are dumped into a 200-lb.-capacity floor-level hopper. A wooden flight conveyor (1 x 10 ft.) then feeds the spuds into a company-built pre-washer.

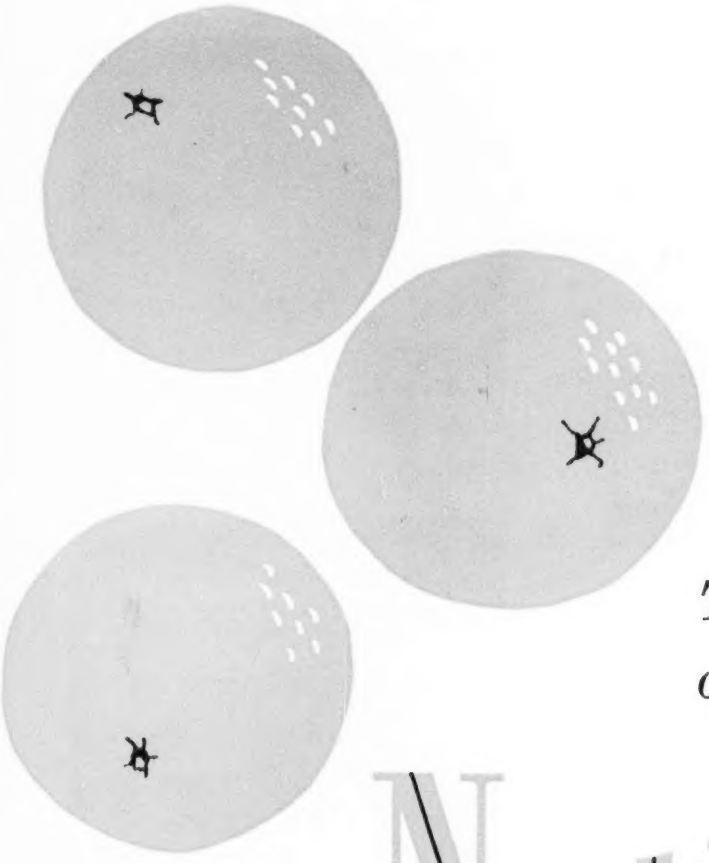
Feeding of potatoes to the line is timed to speed up hand-trimming of peeled spuds by a crew of girls. Employed is an electric timer hooked to a single-stroke bell. When the timer is pre-set, say for 15 sec., an attendant dumps a half bag of potatoes every time the bell rings. By reaching the girls at the trimming table at an even pace, potatoes are trimmed "as they come along" without the workers wasting time seeking the large or easy-to-trim spuds.

Potatoes are now fed to the 3 x 6-ft. pre-washer—a perforated, rotary drum that's half-filled with 140 deg. F. water and a small amount of detergent. Cleaning is attained by tumbling and washing actions. Spuds are tumbled as a spiral vane carries them through the rotary drum, rotating at 10 rpm. Water and detergent are changed four times each shift.

Home-Made Peeler

Washed spuds are next chuted onto a 3 x 12-ft. wooden flight conveyor that elevates them to a company-made lye-peeler. This unit was selected because it was both inexpensive to make and adaptable for continuous operation. It comprises an enclosed 3 x 6-ft. rotary reel, with a small-mesh outer screen and vertical flights attached to the central shaft. The reel is half-immersed in 20% lye solution (sodium hydroxide), which is prepared in a 2 x 3 x 3-ft. tank equipped with a vertical, propeller-type agitator.

A 1-min. immersion in boiling alkali solution (225 deg. F.) is sufficient



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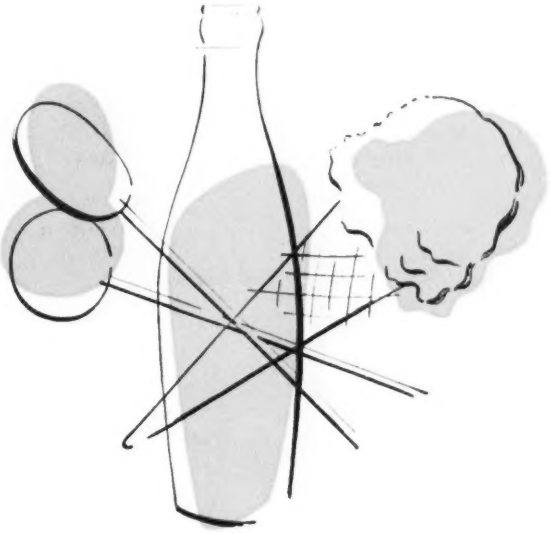

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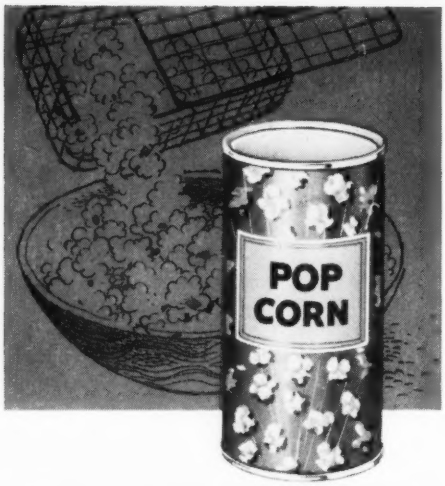

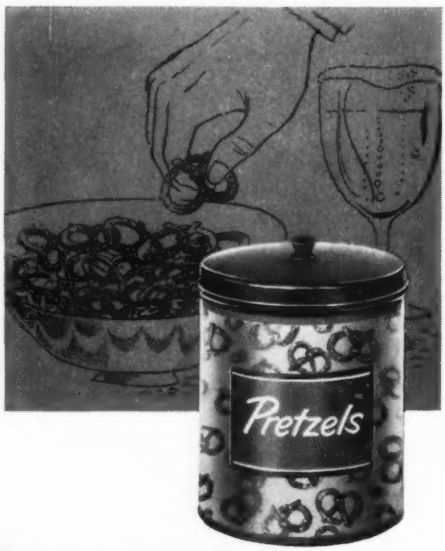

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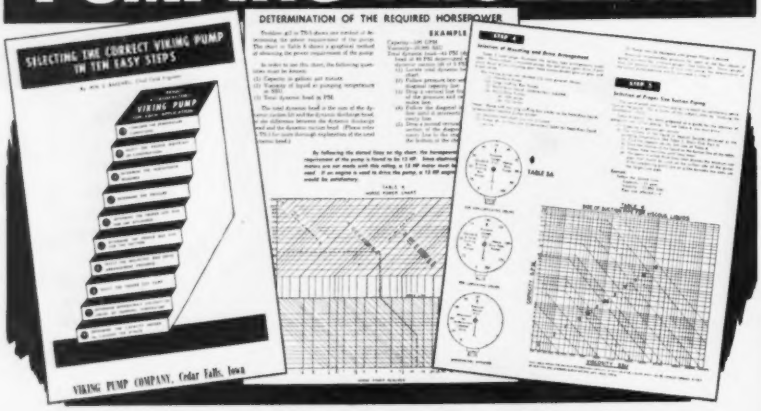
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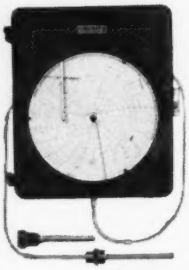

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to penetrate and loosen the potato skin, thus keeping peeling losses at a minimum. The hot lye loosens the skin by reacting with the adhesive material beneath the skin and by cooking the corky layer of the spud.

Removal of loosened skin is then accomplished as potatoes are discharged onto a continuous peeler washer (6 x 12 ft.). Most of this skin is taken off by the machine's rotating rubber flails ($\frac{1}{8}$ x $\frac{1}{2}$ in.) mounted on 6-in.-dia. Pintle rollers. Above are 15 water pipes, each with 6 nozzles for high-pressure spraying any loose skins from the potatoes.

Get Acid Dip

From the peeler-washer, potatoes are chuted into a 1½ x 3 x 12-ft. stainless tank containing 2% citric acid. Purpose of this acid bath (30 sec.) is to wash the spuds and neutralize traces of alkali on them. If alkali were not removed, a yellow flavone discoloration would take place.

A standby, batch-type abrasive peeler is available in the event the lye peeler breaks down. Skins, in this case, are removed by rotating the spuds for 1 min. in a drum with a revolving wavy, silicon-carbon surface metal disk and water sprays.

Peeled potatoes are now discharged onto a 3½ x 50-ft. Neoprene conveyor belt, flanked on each side by ten girls. These workers discard any bad potatoes, cut out decayed spots, and trim dark areas that may remain around the eyes.

Special Trimming Line

Stainless steel vertical dividers (3 in. high) separate the belt into four lanes. Potatoes travel on the outer two lanes nearest the girls on each side of the belt. Trimmed potatoes are then placed in the two center lanes—large ones for French fries in one, small ones for whole potatoes in the other.

Treatment in 1.5% sodium bisulfite bath for 15 sec. is carried out to prevent discoloration—formation of an objectionable red-brown color. Sulfur dioxide formed in this 3 x 3 x 4-ft. stainless steel bath functions as an enzyme inhibitor to check this typical color development on the surface of peeled potatoes.

Next, a stainless steel, wire-mesh, twin-type flight conveyor drains sulfite solution from the potatoes as they are elevated in two rows to a 300-lb.-capacity, two-pocket stainless hopper. One pocket is for whole potatoes, the other for spuds going into slices.

Whole potatoes are discharged from one pocket by opening a hand-operated gate. Then they are packed into 30-lb. bags (2-ply kraft paper, either

LA PORTE FLEXIBLE STEEL CONVEYOR BELTING

La Porte's husky, interlocking steel mesh construction provides you with a smooth-flowing belt system that withstands shock and loading impacts. The open mesh also assures greater resiliency so that belt stretch is no longer a problem. Easier to clean, too, with steam gun or scalding water.

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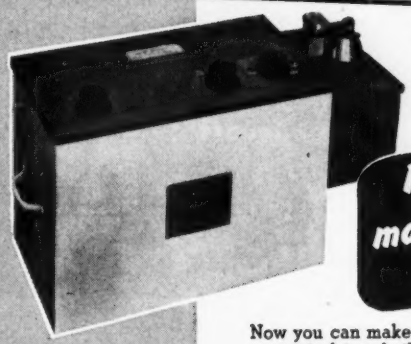

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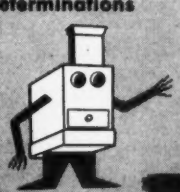

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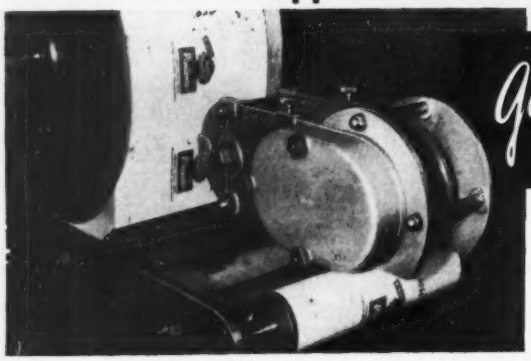

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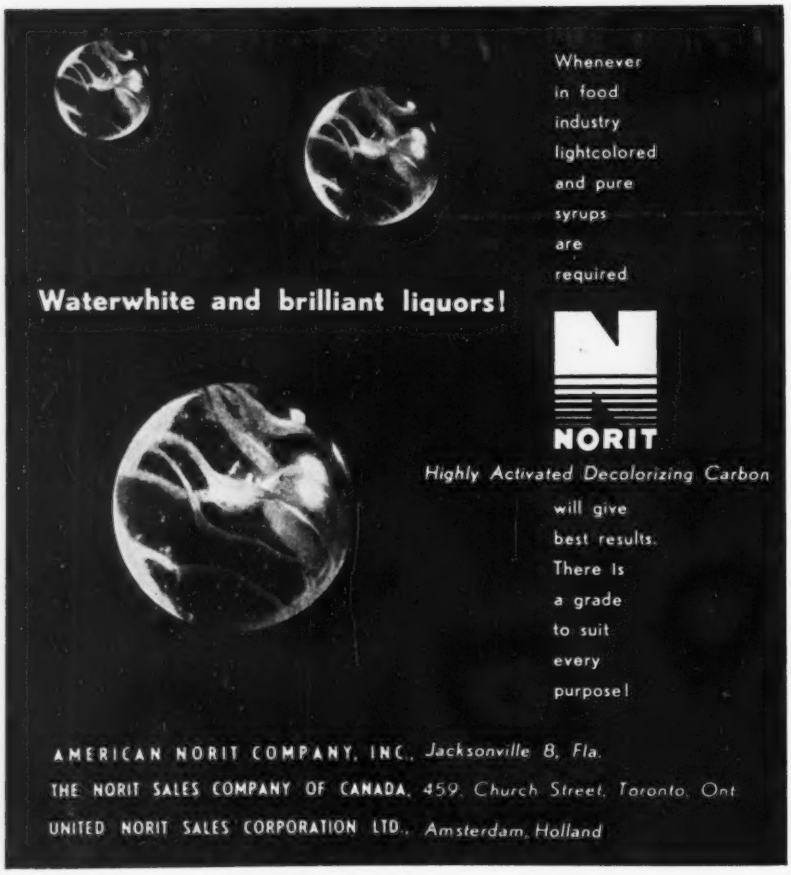
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polyethylene-coated, or poly-lined). The bags are check-weighed, wire-twist sealed, and loaded onto racks that are pushed into a 40-deg.-F. holding room.

French-Fry Slicing

Potatoes to be sliced for French frying are chuted to a 30-lb.-capacity stainless hopper that feeds an Urschel slicer. The ½-in. strips leaving the slicer drop into a stainless tank (3 x 3 x 5 ft.), where they get a second 15-sec. dip in 1½% sodium bisulfite solution. This second sulfite dip is necessary to prevent discoloration of the cut slices.

Strips are then elevated by a 2 x 6 ft. stainless, wire-mesh flight conveyor into a company-built, vibrating screen. Potato slivers going through the ½-in. screen are collected in stainless, perforated, 30-lb. capacity containers. They are sold to restaurants to be used for fish cakes. The strips for French fries are chuted to a dual-bagging station for packing into 30-lb. poly-coated or lined kraft paper bags.

These bags were selected after much testing. They are moisture-resistant, thus prevent surface drying of the potatoes (drying can result in objectionable discoloration and texture changes).

Refrigerated Storage

Bagged potatoes are loaded onto 5-shelf portable racks having a capacity of 30 bags (30-lb.). These racks are pushed into a 15 x 20-ft. refrigerated room. This is a 40-deg.-F. room accommodating 34 racks. Coils are Freon-refrigerated, and there are six blowers.

An adjacent refrigerated holding room (the same size) stores rack-loads of pre-peeled potatoes that have been left overnight in the first 40-deg.-F. room. These potatoes are then the first to be delivered on the following day.

Peeled potatoes must be stored at 40 F. to prevent microbial spoilage—souring and sliming. Other factors influencing storage life are the nature of the raw potato, sanitation, processing techniques, and method of packaging.

Deliveries are made to meet the needs and conveniences of the customers. Generally, they are scheduled every other day. But in some instances daily runs are made.

Inasmuch as the routes are short, refrigerated delivery trucks are not needed. However, precautions are taken to prevent the potatoes reaching 60 deg. F. during deliveries.

End *(Resume reading on page 94)*

Quality Control

CHEMICAL Analysis is an essential tool in maintaining quality control of Foods.

The problem of quality control may be concerned with the development of new products, quantitative estimation of important components and identification of contaminants.

The necessary data thus obtained is used in solving the particular food problems.

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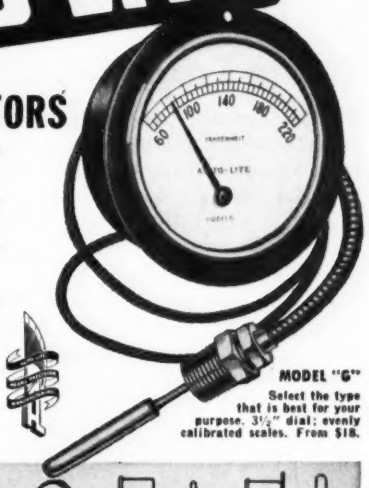

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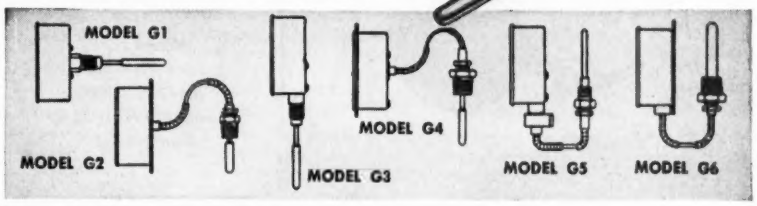

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be sure to send FOOD ENGINEERING your new address!

That's the best way to make sure your copies of Food Engineering will arrive without interruption. Information about your new address should be sent three weeks before you move, to allow time for changing the necessary records.

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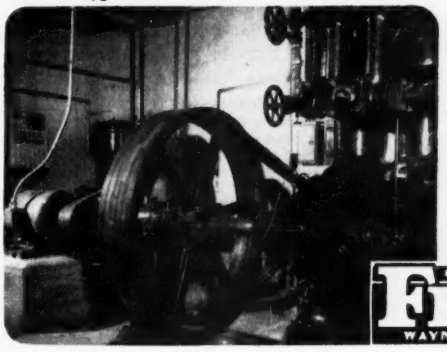

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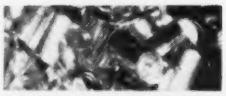

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5,580 Mile Freeze

—*Continued from page 95*

wide and ¾ in. thick, were spaced on 12-in. centers along the sidewalls to provide vertical air circulation. Besides the longitudinal slots in the floor, additional space for air circulation was provided under the bottom of the load by removable aluminum floor racks, 2-in. high.

Insures Temperature Uniformity

But perhaps the most unusual contrivance to insure uniform temperatures throughout the load was a flat strip of canvas attached by hooks to the ceiling and extending to within 4 or 5 ft. of the rear doors. This was an innovation by Transicold. First conceived for trailers having meat rails, its purpose is to assure flow of air to the rear of the trailer.

The canvas is stretched taut longitudinally but attached with sufficient sag to permit transmission of the cold air for the full length of the trailer. The sides hang approximately 1 in. from the ceiling so that the air bleeds out along its full length insuring even distribution.

There was special treatment of this canvas so that it would withstand handling abuse. As compared with a rigid aluminum duct for the same purpose the strip has the advantage of flexibility of adjustment for varying the flow of air at different points in the trailer.

Recommended Loading Method

In loading the cases of orange juice concentrate on the west bound trip, use of the advanced Minute Maid 8x8 in. method would have provided more uniform temperatures throughout the load.

This is a system that has won USDA approval. It consists of installing a metal flange on the floor about 8 in. away from each sidewall. Such flanges prevent the cases on the bottom layer from being butted up tight against the sidewalls and so provide an air channel, 8-in. wide and the height of one case, along both sidewalls clear from the front to the rear of the trailer.

The cases in the second layer and those above are stacked full width across the trailer from the vertical sidewall battens on one side to those on the other.

A further improvement is seen by Minute Maid in switching to use of battens 1-in. wide, 1-in. thick, and spaced on 6-in. centers.

End (*Resume reading on page 96*)

Recent Inventions

PRODUCTS

Foodstuff Produced by Cooking Edible Starch-Containing Tuber Without Water, Adding Dry Edible Starch Powder, Pressing, Frying—*L. Spieser, Zurich, Switzerland to Nibbit Products Assn. Ltd., Zurich. No. 2,665,208. Jan. 5, 1954.*

Corn Puffs by Sheeting Dough Then Rolling Flour Into Sheet, Flour Dusting, Cutting, Cooking in Two Stages—*E. Scott, Weslaco, Texas. No. 2,665,214. Jan. 5, '54.*

Bakery Products From Dough Including Special Proportions of Fungal Amylases—*P. P. Gray, Forest Hills, N. Y. to Wallerstein Co., Inc., New York. No. 2,665,215. Jan. 5, 1954.*

Ice Cream Composition Comprising Milk, Cream, and Sugar, Stabilized With Ammonium and Alkali Metal Salts of Polyacrylic Acid—*J. Kamlet, Stratford, Conn. to The B. F. Goodrich Co., New York. No. 2,665,216. Jan. 5, '54.*

Monosodium Glutamate Crystals Uniformly Coated With Powdered Vitamins—*M. A. Searle, Lincoln, Neb. No. 2,665,988. Jan. 12, '54.*

Stable Fatty Composition Made by Washing in Liquid Form With Glycine and Phosphoric Acid in Solution in Polar Solvent, Separating—*N. H. Kuhrt, to Eastman Kodak Co., Rochester, N. Y. No. 2,665,991. Jan. 12, 1954.*

Vitamin Assay Medium Made by Adding Ferrous Sulfate to Aqueous Solution of Trypsin Hydrolyzed Mammalian Liver Protein, Heating, Removing Precipitate—*J. F. Roland, Jr., Chicago and A. M. Gross, Oswego, N. Y. to Armour and Co., Chicago. No. 2,666,018. Jan. 12, 1954.*

Unhydrolyzed Protein Made by Extracting From Oil-Free Proteinacious Seed With Aqueous Sulfite-Containing Solution, Separating, Precipitating—*S. Rowe, Cincinnati to Buckeye Cotton Oil Co., Memphis, Tenn. No. 2,666,049. Jan. 12, 1954.*

Baking Composition Comprising Mix Containing Activated Dihydroxyphospholipid—*E. F. Glabe to Food Technology Inc., Chicago. No. 2,666,704. Jan. 19, 1954.*

Stabilizing Edible Oils and Fats Against Rancidity Through Addition of Benzene Ring Compound With Tert-Butyl and Alkyl Groups—*R. R. Rosenwald, Western Springs, and J. A. Chenicek, Riverside, Ill. to Universal Oil Products Co., Chicago. No. 2,666,709. Jan. 19, 1954.*

Fish Press Liquor Stabilized Against Substantial Decomposition With Small Quantity Sodium Acid Pyrophosphate—*E. P. McFee, Gloucester, Mass. to Monsanto Chemical Co., No. 2,667,416. Jan. 26, 1954.*

Hard Butter Composition Consisting of Neutral Unhydrogenated Mixed Glyceride Esters of Fatty Acids of Definite Composition—*G. Barsky, New York and G. Zinzalian, Boonton, N. J. to E. F. Drew & Co., Inc., New York. No. 2,667,418. Jan. 26, 1954.*

Dehydrated Food Product Incorporating Monoaliphatic Citrate—*C. M. Gooding, Staten Island, N. Y., H. W. Vahlteich, Englewood, and R. H. Neal, North Bergen, N. J. to Best Foods, Inc., New York. No. 2,667,419. Jan. 26, 1954.*

PROCESSES

Maintaining Stability of Vegetable Oils During Cooking Through Addition of Tertiary-Alkyl-4-Alkoxyphenol—*J. A. Chenicek, Bensenville, Ill. to Universal Oil Products Co., Chicago. No. 2,666,708. Jan. 19, 1954.*

Purifying, Clarifying, Stabilizing Fermentable Fruit Juices by Passing Through Synthetic Cation and Anoin Exchangers to Remove Impurities—*G. Delmousee, G. V. Austerwell, G. Lemoussu, and J. Poupinel, Paris, France. No. 2,667,417. Jan. 26, 1954.*

Decolorizing Safflower Oil by Maintaining at 495 deg. F. for about Five min.—*L. M. Christenson, Lincoln, Neb. 15% to R. J. Norton, Washington, D. C. No. 2,667,499. Jan. 26, 1954.*

Degreasing Glue Bone Tankage by Conveying Through Hot Water, Agitating to Float Off and Remove Fat—*E. N. Mortenson to Swift & Co., Chicago. No. 2,667,500. Jan. 26, 1954.*

Frozen Pizza by Spreading Edible Tomato Product Sealing Agent Over Dough, Pre-Cooking, Quick Freezing, Adding Wet Food Constituent, Again Freezing, Sealing—*J. Bucci, Philadelphia. No. 2,668,117. Feb. 2, 1954.*

Brown Sugar by Heating White Sugar to Caramelize, Adding Raw Sugar To Produce Invert, Mixing With Cane-Flavored Syrup, Then Introducing Into 82-91% High Raw or Refined White Sugar—*B. A. Oxnard and C. H. Criswell, Denver, and A. J. Thomas, Johnstown, Colo to Great Western Sugar Co., Denver. No. 2,668,128. Feb. 2, 1954.*

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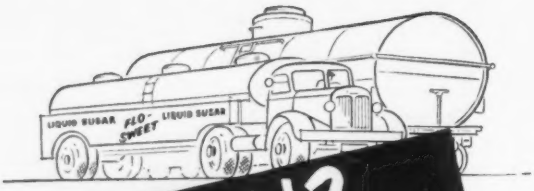

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Counter-Current Movement—*J. E. Nauta, Overveen, Netherlands. No. 2,668,764. Feb. 9, 1954.*

Meat Curing Composition Made By Dissolving Salts in Water Containing Carbonate of Alkali Metal, Flash Drying to Crystals With Na Cl Shells and Centers of Nitrogen Curing Salt—*Lloyd A. Hall to Griffith Laboratories, Inc., Chicago. No. 2,668,770. Feb. 9, 1954.*

Bleaching Shell Eggs With Hydrogen Peroxide While Irradiating With Ultra-Violet Light to Accelerate Action and Kill Bacteria —*H. A. Mulvany, Berkeley, Calif. No. 2,668,772. Feb. 9, 1954.*

Treating Whole Eggs by Progressively Disintegrating Until Entire Product is Converted to Colloidal Mass With Shell Pieces Under 10 Microns—*D. Torr, New York to C. J. Ely, Oakland, N. J. No. 2,669,518 Feb. 16, 1954.*

Producing Beta Dextrose by Heating Alpha Anhydrous Dextrose to Melt, Cooling Without Crystallizing, Seeding With Crystalline Dextrose, Cooling to Complete Crystallization—*F. E. Kite, Riverside, Ill. to Corn Products Refining Co., New York. No. 2,669,530. Feb. 16, 1954.*

Continuous Chocolate Paste Making System Comprising Automatically Fed Premixer Discharging Into Hammer Mill—*H. K. Wiemer, Wallington, England. No. 2,669,924. Feb. 23, 1954.*

Limed Pear Waste Conditioned by Cutting Action to Gel Stage, Heating, Separating — *R. P. Graham, El Cerrito, G. H. Neel, Albany, and N. Fishman, Oakland, Calif. to USA. No. 2,670,289. Feb. 23, 1954.*

Recovering Oat Germ by Steaming and Flaking Hulled Oats, Cooling and Screening Flakes, Separating Germ Stock by Air Screening—*W. F. Hamser to National Oats Co., Cedar Rapids, Ia. No. 2,670,290. Feb. 23, 1954.*

Nut Roasting in Heated Air in Closed Chamber With Temperature Control From Product—*C. L. Emerson, Jr., Newton Highlands, and W. R. Cuming, Boston, Mass. to Electricooker, Inc., Newburyport, Mass. No. 2,670,292. Feb. 23, 1954.*

Smoking and Canning Fish Fillets by Hermetically Sealing In Can With Liquid Smoke Carrier, Then Volatilizing Smoke By Heat—*C. S. Ash, San Francisco, Calif. No. 2,670,295. Feb. 23, 1954.*

Quick Freezing or Cooking Meat Patties by Extruding Under Pressure Into Column, Forming An Opening Through Column, Then Severing Transversely—*L. R. Tansley, Worthington, Ohio to White Castle System Inc., Columbus, Ohio. No. 2,670,296. Feb. 23, 1954.*

EQUIPMENT

Continuous Candy Slicing Assembly Employing Reciprocating Knife That Cuts Forward and Down on the Moving Sheet as it Transfers From Synchromized Conveyors—*E. C. Clement to Mars Inc., Chicago. No. 2,661,707. Dec. 8, 1953.*

Frozen Food Thawing Indicator Consisting of Two-Section Transparent Capsule Containing Two Variable Freezing Colored Liquids —*C. L. Smith, Seabrook, N. J. No. 2,662,018. Dec. 8, 1953.*

Ham Pumping System Automatically Adds Correct Amount of Cure According to Weight of Meat Involved—*B. T. Hensgen and H. G. Reichel to Swift & Co., Chicago. No. 2,663,247. Dec. 22, 1953.*

Egg Weigher and Grader Utilizing Rotating Wheel With Series of Weighing Units and Selective Channel Discharge—*O. Parker, Canoga Park, Calif. No. 2,663,422. Dec. 22, 1953.*

Shrimp Deveiner With Gravity Feed, Engaging Resilient Rolls, Cutter Blade—*E. F. Greiner, New Orleans, La. No. 2,663,898. Dec. 29, 1953.*

Poultry-Gizzard Opener Consisting of Endless Belt With Impalers and Positioned Knife Point—*G. R. Biddinger, Bellwood, and C. H. Koonz, to Swift & Co., Chicago. No. 2,663,899. Dec. 29, 1953.*

Shrimp Deheading Unit Employing Differentially Progressive Pulling Force to Head and Body—*C. A. Greiner and E. F. Greiner, New Orleans, La. No. 2,663,900. Dec. 29, 1953.*

Pressure-Type Filling Injector for Bakery Products With Plurality of Vertical Nozzles and Inverted Pan-Supporting Flange—*J. M. Galvin, Indianapolis. No. 2,664,054. Dec. 29, 1953.*

Depositor for Marshmallow, Dough, Batter and Like Products Consisting of Multiple Nozzle Assembly Suspended Over Moving Belt With Valve Operation Integrated With Reciprocating Motion of Assembly—*E. T. Oakes, Douglaston, N. Y. to The E. T. Oakes Corp., Islip, N. Y. No. 2,664,055. Dec. 29, 1953.*

Dough Former and Packer Comprising Movable Dough Sheet Carrier With Plunger and Openings Feeding Beltborne Containers Below—*L. Armstrong, H. How and L. B. Willoughby, Louisville, R. C. B. Morton, Prospect, Ky. to Pillsbury Mills Inc., Minneapolis, Minn. No. 2,664,833. Jan. 5, 1954.*

Edible Receptacle-Former Employing Rotating Rod-Bearing Supporting Ring and Dual Dies—*J. Balton to Maryland Baking Co.,*

Cut Costs with POWERS

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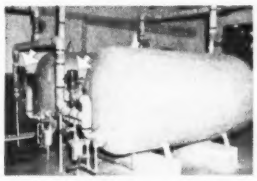

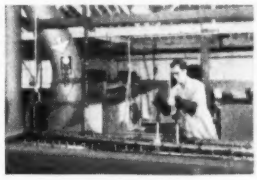

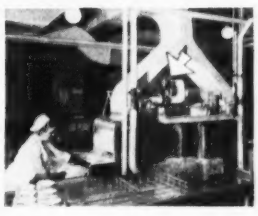

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Pyrethrum plus newly developed insecticidal chemicals give Diverside greater kill power per dollar. Absolutely safe to use. Non-toxic. Contains no DDT. And, what's more, DIVERSEY provides you with a complete system tailored to your needs. Call your DIVERSEY "D-MAN" for a free demonstration today!
THE DIVERSEY CORPORATION
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Inc., Baltimore. No. 2,664,834. Jan. 5, 1954.

Fluid-Material Moisture-Percentage Measuring Device Utilizing Passage of Stream Between Condenser Plates in High-Frequency System and Measuring Changes in Capacitance—*C. E. Rogers, Akron, Ohio to Quaker Oats Co., Chicago. No. 2,665,409. Jan. 5, 1954.*

Corn Kernel Slicer Employing Shearing Edges Below Series of Product Discharge Passages and Rotating Cutting Wheel—*J. R. Urschel and G. W. Urschel, Valparaiso, Ind. No. 2,665,723. Jan. 12, 1954.*

Meat Chopper With Refrigerated Jacket Around Advancing Screw and Cutter—*A. W. Lundell, Byram to Globe Slicing Machine Inc., Stamford, Conn. No. 2,665,724. Jan. 12, 1954.*

Bagel-Dough Ring-Former Molds U-Shape Pieces, Joins These and Rounds Finished Piece—*L. Gendler, New York, and M. Lazar, Jamaica, N. Y. to American Bagel Machine Co., Inc., New York. No. 2,666,398. Jan. 19, 1954.*

Tortilla Former Utilizing Dough Roller and Rotary Cutter—*A. J. Pereyra, Bremerton, Wash. No. 2,666,399. Jan. 19, 1954.*

Applicator for Shredded Material to Bakery Products Employing Forminous Conveyor and Paddle to Move Shreds Onto Moving Product—*B. S. Budney to Automatic Roll Machine Co., Inc., New York. No. 2,666,410. Jan. 19, 1954.*

Cherry Pitter and Stemmer With Stem Suspending, Pulling, and Pushing Action—*J. C. Aguilar and W. A. Cox, San Francisco. No. 2,667,196. Jan. 26, 1954.*

Grain Huller Utilizing Compressed Air Against Kernel and Anvil Surface—*J. E. Giles, Lockport, Ill. No. 2,667,197. Jan. 26, 1954.*

PACKAGING

Frozen Concentrate Beverage Packaged in Plurality of Spaced, Sealed, Nesting Cups—*J. H. Kaufmann, Eustis, Fla. No. 2,667,422. Jan. 26, 1954.*

Frozen Fruit Juice Container With Internal Ice Shell—*H. A. Simpson, Oviedo, Fla. No. 2,667,423. Jan. 26, 1954.*

Continuously Filling Pumpable Product Into Flanged Containers at Predetermined, Uniform Rate—*W. McK. Martin, San Mateo to James Dole Engineering Co., Redwood City, Calif. No. 2,667,424. Jan. 26, 1954.*

Joining Two Pieces of Thermoplastic Material With Low Dielectric Loss Factor Utilizing Buffer Material and High Frequency Electric Field—*C. M. Zoubek, Oak Lawn, Ill. to Swift & Co., Chicago. No. 2,667,437. Jan. 26, 1954.*

Continuous Pasty-Article Wrapper Comprising Flexible Tube Feed and Pressing Means, Divider, Sealing Substance Applicator—*J. E. Brandenberger, Paris, France to Societe la Cellophane, Basel, Switzerland. No. 2,667,723. Feb. 2, 1954.*

Candy Molder With Stick Inserting Means—*J. M. Carris and C. L. Crane, La Habra, Calif. No. 2,667,847. Feb. 2, 1954.*

Partition-Type Egg Carton Erecting Device—*M. Burger, Morris, Ill. to General Package Corporation, Chicago. No. 2,668,482. Feb. 9, 1954.*

Bag-Filling Device With Valved Pivotally Mounted Chute to Permit Bag Removal—*E. W. Carlsen, Yakima, Wash. to People of USA. No. 2,668,648. Feb. 9, 1954.*

Pump Structure Mounted on Food Container, Operable by Hand-Plunger, Which, Through Reversible Parts. Will Produce Either Vacuum or Compressed Air In Can—*V. B. Lazerus, Galveston, Tex. No. 2,669,176. Feb. 16, 1954.*

Filling Machine Adapted to Deliver Metered Amounts of Solid Comminuted Materials Utilizing Regulated Air Pulses and Metering Cavity—*C. A. Heisterkamp, Wynnewood, and M. Dann and J. P. Dura, Philadelphia, Pa. to American Home Products Corp., New York. No. 2,670,101. Feb. 23, 1954.*

Filler for Packing Meat or Other Sticky Products Into Cans Employing Reciprocating Plunger With Means for Automatically Fluid-Lubricating Face Surface—*W. J. Dobbins, 3rd., Little Falls, N. Y. to American Can Co., New York. No. 2,670,114. Feb. 23, 1954.*

Extrusion Type Filler for Ice Cream and Other Semiplastic Foods Employing Series of Pressure Nozzles—*F. M. Johansen, Milwaukee, Wis. No. 2,670,116. Feb. 23, 1954.*

Sausage Casing Sealer Consisting of Flattened Winding of Stiff Wire Coated With Soft Protective Plastic—*J. J. Frank, Union, N. J. No. 2,670,294. Feb. 23, 1954.*

Want more information on any of these recent patents? If so, you may obtain detailed printed copies by writing direct to the U. S. Patent Office, Washington, D. C., giving serial numbers for those you want and enclosing 25¢ for each copy.

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...doing an excellent job at the Adams Corporation

Yes, at the Adams Corporation, where the famous, tasty "Korn Kurls" are made — where sanitation and cleanliness in handling this food product is absolutely essential — Sparks Belting is performing with speed and efficiency — and satisfaction!

The Sani-Cleat Belting shown is White Ny-Tex, 16 inches wide, with 1 inch-high Sani-Cleats on 12 inch centers — a belting that is ideal for all food products, as is being proved by scores of manufacturers of perishable products. It looks clean, is clean and can be kept clean. It is thoroughly impregnated against oil, greases, juices and heat, and is highly resistant to bacterial development.

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This emblem appears on all Sparks Belting — Ny-Tex, Sno-Tex, Kotton-Top, Tred-Tex, Golden-Tex, Neoprene, etc., — in fact, a belt for every operation in food plants.

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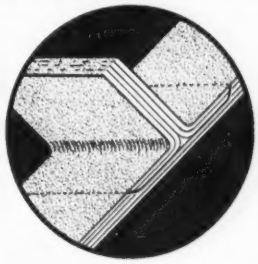

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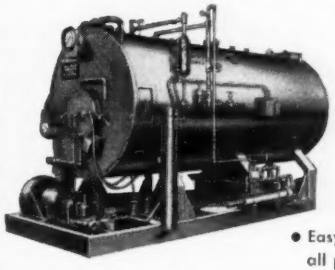

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HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885

Men & Companies

B. Glenn MacNary has been elected vice-president of Continental Baking Co., having been associated with that company since the beginning of his business career.

Industry

Ac'cent International, manufacturers of seasonings, has purchased a modern packaging plant in Chicago with production potential of 280,000 packages daily.

Andrews Freeze Plant, Prosser, Wash., will be expanded at cost of $100,000 to increase its total pack to 6,000 tons in 1954.

Beech-Nut Packing Co. has formed a chemical dept. for manufacturing polyvinyl acetate resins.

Borden Co. has named Harold R. Fagerson and Fred J. Barter as new vice-presidents.

Burrus Mills, Inc., announced completion of Light Crust Flour Mills, Southwest's first refrigerated plant, for manufacture of frozen dough products.

Burry Biscuit Corp. has acquired all capital stock of LeRoy Foods, Inc., Brooklyn.

California Packing Corp. has scheduled a $150,000 expansion of warehouse facilities at San Jose.

Campbell Soup Co. is planing a new plant for the production of all their products except frozen soups.

Canadian Canners (Western) Ltd. will build a $2,000,000 cannery in Vancouver, B. C.

Carling Brewery Co., Cleveland, plans construction of a new brewery in New England.

Christie, Brown & Co., Ltd., Nabisco Canadian subsidiary, will construct a multi-million dollar biscuit and cracker bakery in Montreal, and is also currently completing extensive modernization of its Winnipeg plant.

Cocoa and Chocolate Manufacturers Assn., of U. S. has elected Clive C. Day of Nestle Co. as president, and Lester W. Majer, of Hershey Chocolate Corp., vice-president.

Franklin Baking Co., Goldsboro, N. C., has been capitalized at $300,000 to manufacture, sell, and export bakery and food products.

General Food Corp. has elected Charles G. Mortimer as president and chief executive officer to succeed Austin S. Iglehart, who was named chairman.

General Mills, Inc., is beginning production of prepared food mixes in its Toledo plant.

Gerber Products Co. has announced a long-range expansion program of its Rochester, N. Y., plant.

Husman Potato Products Co., has filed articles of incorporation in Cincinnati, with capital stock of $300,000.

Interstate Bakeries Corp., nationwide organization with headquarters in Kansas City, has expanded its operations into Northern California with the acquisition of Remar Baking Co., Oakland's largest baking firm.

Kellogg Co., Battle Creek, Mich., and Pillsbury Mills, Inc., Minneapolis, have united to form a Canadian company to be known as Kellogg-Pillsbury of Canada, Ltd. Kellogg Co. also announced a $4,000,000 plant operation program.

Ernest Weill has been elected vice-president in charge of production for S. Gumpert Co., Inc., with duties to extend to the company's Ontario, New York, and Philadelphia plants.

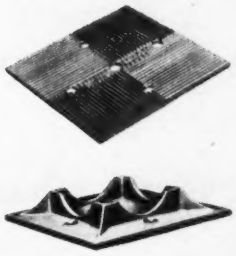
Drehmann Floor Engineering Puts a Stop To Constant Replacement

Is the vicious cycle of floor breakdown —patch—repair—tear-out—rebuild— slowing down production, piling up your overhead?

Then, before more money goes down the drain, consult Drehmann, the most experienced floor contractor in the food field. Let this resourceful organization show you how your problem can be solved by converting to long-life, maintenance-saving Sani-Brick and Sani-Plate.

The ability of Drehmann installations to withstand food plant abuse is a matter of record. In plant after plant, floors laid by Drehmann twenty and more years ago are still in excellent condition—in spite of punishing treatment. No wonder Drehmann installations are the choice of every branch of the food industry—small, local processors as well as giant multi-unit organizations.

DREHMANN SANI-PLATE



Heavy cast iron construction withstands abrasion, impact, constant moisture, corrosives, extreme heat and cold. Patented deep underside ribbing assures rigid, everlasting bond.

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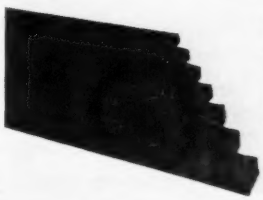

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The very lives of your employees are at stake. Yours is a grave responsibility. Consider what may happen.

When the emergency comes, everybody's going to need help at the same time. It may be hours before outside aid reaches you. The best chance of survival for your workers—and the fastest way to get back into production—is to know what to do and be ready to do it. To be unprepared is to gamble with human lives. Disaster may happen TOMORROW. Insist that these simple precautions are taken TODAY:

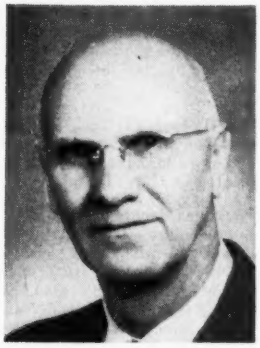
☐ **Call your local** Civil Defense Director. He'll help you set up a plan for your offices and plant—a plan that's safer, because it's entirely integrated with community Civil Defense action.

☐ **Check contents** and locations of first-aid kits. Be sure they're adequate and up to date. Here again, your CD Director can help—with advice on supplies needed for injuries due to blast, radiation, etc.

☐ **Encourage personnel** to attend Red Cross First Aid Training Courses.

☐ **Encourage your staff** and your community to have their homes prepared. Run ads in your plant paper, in local newspapers, over TV and radio, on bulletin boards. Your CD Director can show you ads that you can sponsor locally. Set the standard of preparedness in your plant city. There's no better way of building prestige and good employee relations—and no greater way of helping America.

Act now . . . check off these four simple points . . . before it's too late.



Rudolph M. Sandstedt, professor of chemistry at University of Nebraska, will be awarded the American Assn. of Cereal Chemists' highest honor, the Thomas Burr Osborne Medal, at the Assn's 39th Annual Meeting at Denver.

Maplecrest Farms, Inc., Denver, has begun construction in De Queen, Ark., on $250,000 processing plant.

Monticello Canning Co. will construct a new pimento canning plant at Crossville, Tenn.

National Biscuit Co. has acquired all the outstanding capital stock of Hills Brothers Co., producer of the Dromedary line of food products.

Omar Bakeries has appointed David Van Braun to be production manager of Omar's Milwaukee plant, and Raymond A. Zaccardi as production manager of its recently acquired bakery in Cleveland.

F. M. Schaefer Brewing Co. has named the following officers: John F. Bockelmann, senior vice-president; Howard H. Jones, vice-president and director; and Alvin E. Heutchy, secretary and director.

Seven-Up Bottling Co. is planning their third Chicago plant.

Southern Dairies, Inc. held the formal opening recently at its new $1 million plant in Charlotte, S. C.

Thielmann Sausage Co., Inc., has moved its processing operations from Elkhart Lake, Wis. to a new and larger plant in Sheboygan.

Welch Grape Juice Co. is in the midst of a $350,000 expansion program at its Grandview, Wash., plant.

Personnel

D. N. Abercromby has been named general manager of Howe Candy Co., Hamilton, Ont.

Dr. Benjamin Borenstein has been appointed to the research staff of Fearn Foods Inc.

C. L. Callaway, formerly in charge of the company-owned plants, has been named chief of the Dallas Dr. Pepper Bottling Co.'s new operation department.

W. C. Day was elected president of California Grape and Tree Fruit League in Fresno.

John E. Dodds, vice-president of Schuckl & Co., Inc., was elected president of Canners League of California at the 50th Annual Meeting.

Alfred W. Eames, Jr., has been elected to the board of California Packing Corp.

Ogden A. Geilfuss, formerly vice-president of National Yeast Corp., is new president of Columbia Baking Co., Atlanta, Ga.

John A. Grammer was elected secretary of Beech-Nut Packing Co.

Mr. Oliver Hancocks, executive vice-president of Wonder Bakeries Ltd., has been elected to the board of directors of Consolidated Bakeries of Canada Ltd.

L. M. Hunter is new vice-president in charge of physical plant properties of Coca-Cola Ltd., Ottawa.

Kenneth Jackson, assistant manager of Pet Milk Co. plant in Delta, Ohio, has been transferred to a similar post in Coldwater, Ohio.

Ross E. Jones, Jr., has been advanced to newly created position of general manager of distribution of H. J. Heinz Co.

Fredric R. Mann is new director of National Container Corp., New York City.

William S. Oliver, executive vice-president, was named a director of American Sugar Refining Co., New York City.

Edwin L. Noble, previously manager of Oregon division of S&W Fine Foods, Inc., has been named manager of the company's Berkeley, Calif., division.

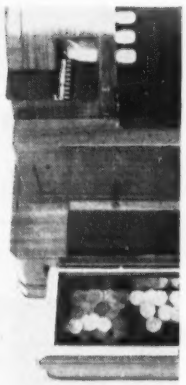
William Ostermann has been appointed manager of Swift & Co.'s general margarine department.

Morehead Patterson, chairman and president of American Machine & Foundry Co., was appointed 1954 Chairman of U. S. Committee for United Nations Day.

Irvin T. Ragsdale was elected a director of Columbia Baking Co., Atlanta, Ga.

Paul V. Rea has been advanced to the post of execu-

packaging with the accent on selling



Here are emphatic results to prove it! When the new Accent packages—created by Ritchie—were recently introduced, sales increased up to 200%. And for good reasons! The fresh, striking design steps up the stopping power of the packages. And when shoppers stop, they quickly see how easy the new packages are to handle—how the unique, rotating plastic tops simplify opening and closing. Another selling package from Ritchie! Wouldn't you like to have one that would do as good a job for you?

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Mix your product in this portable Cherry-Burrell Rollaway Univat and heat with either steam or electricity . . . pull it to any desired point in your processing system for unloading . . . and you can count on improved product quality and flavor.

Long-sweep propeller agitator provides gentle, positive agitation for fast heating . . . thorough mixing and blending of ingredients. Water jacketing assures uniform heating action over entire tank lining, whether steam or electricity is used.

Sanitation? It's built-in; linings and covers are non-corrosive, easy-to-clean stainless steel.

Portable as well as stationary Univat mixers with adjustable leg heights are made in 50 and 100 gallon sizes. For complete details see your Cherry-Burrell Representative OR CLIP COUPON.

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Russell J. Hug has been promoted from assistant to the president of General Baking Co., New York, to company vice-president.

tive vice-president of U. S. Products Corp., Ltd., California canners.

Associated Industries

Acmor Conveyor Chain Co., Cleveland, has named J. T. AuWerter, Jr., president of the company.

Air-Conditioning and Refrigeration Institute has elected A. J. DeFino, vice-president of Fedders-Quigan Corp., Buffalo, president at its annual director's meeting.

Atlas Powder Co., Canada Ltd., and Atlas Powder Co. of Wilmington, Del. are constructing a large plant in Brantford for chemical emulsifiers, costing $350,000, the first unit to be in operation this year.

Babcock & Wilcox's Tubular Products Div. new vice-president is W. J. Thomas,.

Borg-Warner Corp. has promoted T. J. Ault to the presidency and general managership of the Detroit Gear division.

Container Corp of America, Chicago, has named Donald H. Brewer and Leo H. Schoenofen senior vice-presidents.

Canadian Crown Cork Co. is constructing a new plant in Montreal costing $340,000 and expected to be in operation in Oct., 1954.

Fairbanks, Morse & Co. has announced formation of a new "Electronics Div.", and also the election of O. S. Leslie as vice-president in charge of manufacturing.

Mathematical Computing Service has been organized to provide services for industries desiring engineering calculations of high complexity.

Niagara Filters Division (American Machine & Metals, Inc.,) has appointed Seymour Weinstein to be technical director.

Olin Industries, Inc., has announced plans for erection of a new cellophane plant to be located at Kern, Indiana.

Package Machinery Co. of E. Longmeadow, Mass., has purchased Transparent Wrap Machine Corp. of Hasbrouck Heights, N. J. and also acquired full ownership of National Bread Wrapping Machine Co., Springfield, Mass., formerly jointly owned with Baker Perkins Inc.

Richardson Scale Co., Clifton, N. J., manufacturers of materials handling equipment, has appointed Dr. William H. Newman of Columbia U. to its board of directors.

Foster D. Snell, Inc., consulting chemists and engineers, has announced the promotion of Dan Schoenholz to director of the product development dept.

Kenneth S. Valentine has set up business as manufacturers' representative in New York to initially represent Manton-Gaulin Co.

Jacques Wolf Co., manufacturing chemists firm, has elected Schuyler E. Tylee, president; Gerald J. Desmond, vice-president, treasurer and general manager; and Arnold Pfister, secretary and plant manager.

Deaths

Clyde E. Beardslee, 66, dean of American dry milk industry and former vice-president of Borden Co.—April 8.

Elbridge H. Gerry, 71, owner of Gerry Cider and Vinegar Mills, Lynnfield, Mass. — March 26.

J. C. Haley, 69, co-founder and for 40 years president of Brown & Haley, candy manufacturers of Tacoma, Wash.—March 25.

Jacob Sherman, 51, president of Sherman-Simon Provision Co., meat packers.—March 21.

Howard Leslie Walker, 69, vice-chairman of board of Canadian Food Products, Ltd. —March 20.

Robert MacKenzie Wellwood, 64, chairman of board of Sheffield Farms, Inc.—April 2.

Roscoe E. Whitworth, 54, president since 1944 of Nutrena Mills, Inc.—March 22.

Henry E. Worcester, 78, retired president of United Fruit Co.—April 9.

MORE POWER IN SMALLER FRAMES

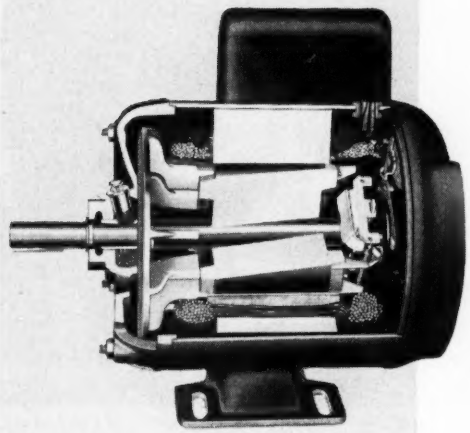
SAVE SPACE

WEIGH LESS

NEW Century Form "F" Fractional H.P. Motors

NOW AVAILABLE IN ⅛ TO ¾ H.P.

Thanks to new techniques developed in the last several years, this *smaller* power package combines improved performance with even greater Century dependability.



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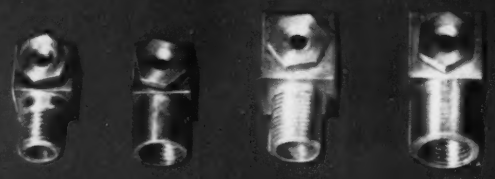

YARWAY Bar-Stock Involute Nozzles

YARWAY Type B Involute Nozzles

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Most popular design for cooling, recooling, washing, rinsing, air conditioning, drying and other spraying operations in industrial and processing work and in power plants.

Non-clog involute design has no internal parts (vanes or deflecting plates) on which foreign particles can collect. Special contour of nozzle body guides flow with minimum loss of energy towards discharge opening, where liquid attains maximum velocity and leaves nozzle in a fine hollow-cone spray.

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Sizes ¼" and ⅜", male or female connection
Capacities up to 3 gpm; pressures 20 to 50 psi

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Five sizes, ½" to 1½"
Capacities up to 40 gpm; pressures 7 to 25 psi

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Sizes 2" and 2½"
Capacities up to 110 gpm; pressures 7 to 15 psi

Write for YARWAY Spray Nozzle Book N-617; it gives capacities, dimensions and application information.

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Preferred for many washing and cooling operations. Non-clog design, delivers flat fan-shaped sheet of spray with slicing action particularly desirable for surface washing.

Thin sheet of spray is discharged forward 30° from the vertical, spreading in fan shape up to 140°, depending on operating pressure.

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New Catalogs and Bulletins from manufacturers of equipment and supplies —Free For The Asking—

Food Plant Equipment

Storage Heaters

Photos and descriptions of line of hot water storage heaters with information on piping arrangements and installation data. Catalog 18. 48 p.—*Patterson-Kelley Co., Inc., 371 Warren St., E. Stroudsburg, Pa.*

Circle 237A on Reader Service Card

Clutches and Brakes

Features, applications, dimension tables and many illustrations of types of clutches and brakes. Bulletin 400-A. 34 p.—*Fawick Airflex Div., Federal Fawick Corp., 9919 Clinton Rd., Cleveland 11.*

Circle 237B on Reader Service Card

Blow-Off Valves

Data on seatless blow-off valves for boiler pressures up to 400 lb. with installation recommendations. Bulletin B-426. 20 p.—*Yarnall-Waring Co., Mermaid Lane, Philadelphia 18.*

Circle 273C on Reader Service Card

Steel Boilers

Latest data on line of high and low pressure steel boilers in reference guide form especially designed for use by architect, engineer, and heating contractor. 32 p. General Catalog.—*Kewanee-Ross Corp., Kewanee, Ill.*

Circle 237D on Reader Service Card

Ventilation Filters

Specifications, engineering and performance data covering dry type panel filters for ventilation and air conditioning. Bulletin 600. 8 p.—*Dollinger Corp., 11 Centre Park, Rochester 3.*

Circle 237E on Reader Service Card

Spray Dryers

Diagrams showing comparative methods of drying products and questions and answers on use of spray dryers. 8 p. booklet.—*Foster D. Snell, Inc., 29 W. 15 St., New York City 11.*

Circle 237F on Reader Service Card

Automatic Lubricators

Details and photos of models for automatic and precision lubrication. Leaflet.—*Nathan Mfg. Corp., 416 E. 106th St., New York City 29.*

Circle 237G on Reader Service Card

Pressure Cooker

Design and construction features of models of pressure cookers and coolers and four types of positive feed elevators. Bulletin YB 3039. 12 p.—*Food Machinery & Chemical Corp., Canning Mchy. Div., San Jose 6, Calif.*

Circle 237H on Reader Service Card

Steam Traps

Condensate capacities, sizes, weights, and prices of steam trap said to vent air from steam units 8 times faster than ordinary inverted bucket traps. Bulletin 1153. 4 p.—*V. D. Anderson Co., 1935 W. 96th St., Cleveland 2.*

Circle 237I on Reader Service Card

Burner Equipment

Oil and gas burner equipment with discussion of principles involved in selection and application, and conversion tables. Bulletin OB-53. 28 p.—*Engineer Co., 75 West St., New York City 6.*

Circle 237J on Reader Service Card

Centrifugal Pump

Magnetically driven combined motor and centrifugal fluid pump which requires no mechanical seals or stuffing boxes. Bulletin G-1000. 4 p.—*Chempump Corp., 1300 E. Mermaid Lane, Philadelphia 18.*

Circle 237K on Reader Service Card

Air Compressor

Features of water-lubricated machine to compress clean, pure air, especially adapted to brewing industry. Bulletin 24. 4 p.—*Haselberg Co., 7703 Roosevelt Rd., Forest Park, Ill.*

Circle 237L on Reader Service Card

Bag-Making Machine

Information and specifications on 5 models of cellophane bag-making machine, including accessories. Bulletin SPM-3. 4 p.—*Simplex Packaging Machy., Inc., 534 23rd Ave., Oakland 6, Calif.*

Circle 237M on Reader Service Card

Heating Devices

Electric heaters and heating devices, including details of application, special features, installation and methods for determining power requirements. 1954 Catalog. 60 p.—*General Electric Co., Schenectady, N. Y.*

Circle 237N on Reader Service Card

Sand Pumps

Vertical centrifugal pump for handling frothy abrasive pulps with capacities, hp requirements, operating features and applications. Bulletin P10-B5.—*Denver Equipment Co., 1400 17th St., Denver 17.*

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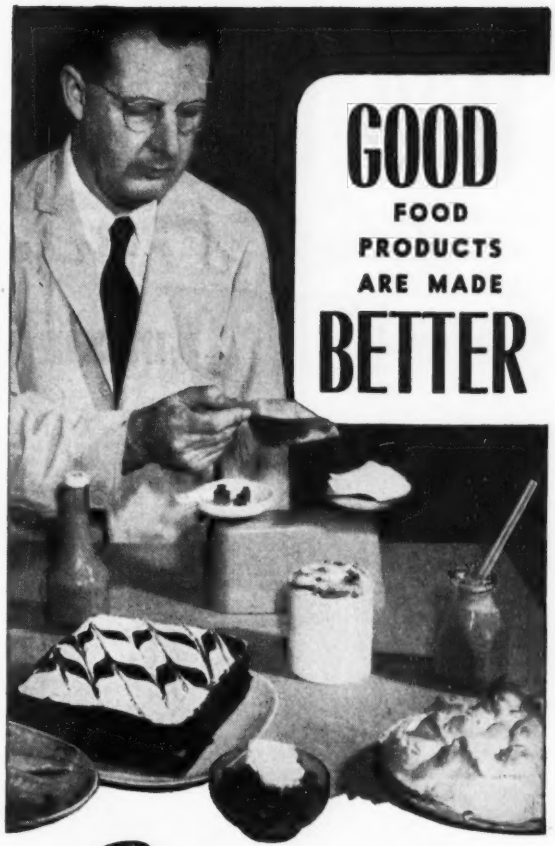

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* SeaKem is the registered trademark for the standardized, water-soluble, sea plant extractives manufactured by the Seaplant Chemical Corporation. Refined by rigidly controlled processes which insure dependable uniformity and purity, SeaKem "Colloids Out of the Sea" are light amber to colorless, free-flowing flaky powders. Available in a variety of types suitable for use in either dry or liquid applications, SeaKem Stabilizers have won acceptance on the basis of proven advantages with leading food manufacturers and processors.

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AGITATOR PARTS QUICKLY REMOVABLE FOR EASY CLEANING

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Disk Feeder

Model for accurate and continuous feeding of dry materials shown with various accessories. Bulletin 50-K57. 4 p.—*Omega Machine Co., 345 Harris Ave., Providence 1, R. I.*

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Beer Tanks

Description and illustrations of tapered glassed steel storage tanks for beer. *Pfaudler Co., Rochester 3, N. Y.*

Circle 238B on Reader Service Card

Bottle Uncaser

Description and diagrams of pneumatically-operated bottle uncaser. Bulletin AD 5390. 4 p.—*Liquid Carbonic Corp., 3100 S. Kedzie Ave., Chicago 23.*

Circle 238C on Reader Service Card

Steel Fittings

Dimension tables and resistance data of new line of stainless steel fittings for joining pipe or tube without threading or welding. Bulletin Q100. 20 p.—*Cooper Alloy Foundry Co., Hillside, N. J.*

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Heating Systems

Description and illustrations of various types of heating systems utilizing high-temperature, low-pressure vaporizer. Catalog A-100. 28 p.—*Eclipse Fuel Engineering Co., Rockford, Ill.*

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Hammer Mills

Models of heavy-duty hammer mill with instant screen change. Bulletin 1153-S. 4 p.—*Schutte Pulverizer Co., 27 Clyde Ave., Buffalo 15, N. Y.*

Circle 238F on Reader Service Card

Rubber Pumps

Description of hard rubber pumps, valves and pipe fittings manufactured specifically for the chemical process and allied industries. 4 p. folder.—*Vanton Pump and Equipment Corp., Empire State Bldg., New York City 1.*

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Carton Opener

Details and photos of operation of electric carton opener, 4 p. leaflet.—*Atlanta Paper Co., Atlanta, Ga.*

Circle 238H on Reader Service Card

Steel Tubing

Information on comparative corrosion resistance of stainless steels to corrosion. Bulletin TDC 160. 8 p.—*Babcock & Wilcox Co., Beaver Falls, Pa.*

Circle 238I on Reader Service Card

Aluminum Tanks

Questions and answers on design, fabrication and uses of aluminum tanks and pressure vessels. Form 24. 4 p.—*Reynolds Metals Co., Louisville, Ky.*

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Chemical Porcelain

Line of pipe, fittings, spacers, vertical check valves, joints, flanges, etc., in chemical porcelain. Bulletin CP-50. 8p.—*U. S. Stoneware, Akron 9, Ohio.*

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Refrigerating Equipment

Centrifugal refrigerating machine driven by steam turbine for use in brewing processes with photos of actual applications and engineering data. Bulletin 30-F-22. 30 p.—*Carrier Corp., Syracuse, N. Y.*

Circle 238L on Reader Service Card

Automatic Boilers

Features of compact packaged automatic boilers in sizes from 15-500 hp for steam processes as well as steam and hot water heating service. 4 p. brochure.—*Orr & Sembower, Inc., Morgantown Rd., Reading, Pa.*

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Tranmission Belts

Line of flat transmission belts and applications with construction data and specifications. 4 p. booklet.—*Quaker Rubber Corp., Tacony & Comly Sts., Philadelphia 24.*

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Control Equipment

Pressure Transmitters

Features of autronic differential pressure transmitter with data on principles of operation and many illustrations. Bulletin A-707-A. 4 p.—*Swartout Co., 18511 Euclid Ave., Cleveland 12.*

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Motor Starters

Buying information on magnetic motor starters, push button stations, and magnetic reversing controllers, with photos of equipment, circuit diagrams, and application data. Bulletin GEA-6061. 6 p.—*General Electric Co., Schenectady, N. Y.*

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Filling Scales

Description of two filling scales built especially for production weighing of granular, flake, pellet or fibrous materials. Leaflet.—*Thayer Scale and Engineering Corp., E. Water St., Rockland, Mass.*

Circle 238Q on Reader Service Card

Control Catalog

Detailed engineering data for choosing proper control system for furnaces, ovens, dryers and kilns, with photos and application and dimension drawings. Bulletin P1260. 48 p.—*Bristol Co., Waterbury, Conn.*

Circle 238R on Reader Service Card

Filter Models

Several types of filter units with information on how to select those most suitable. 10 p. illustrated folder.—*British Filters Ltd., Old Court, Cox Green, Maidenhead, Berks, Eng.*

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Portable Scales

Information on full and bench height models of portable scales. Form 2004. 4 p.—*Toledo Scale Co., Toledo 1, Ohio.*

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Flame Photometer

Operation features of instrument for the analysis of sodium and potassium. Bulletin 37. 4 p. —*Baird Associates, Inc., 33 University Rd., Cambridge 38, Mass.*

Circle 239C on Reader Service Card

Signal Transmitter

Description and illustrations of pneumatic signal transmitter designed for use with ring balance meter. Form 114112-13. 4 p.—*Hagan Corp., Hagan Bldg., Pittsburgh 30.*

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Bulb Thermometers

Selection data, construction features and illustrations of remote bulb thermometers, recorders and indicators, psychrometers, tubings and fittings. Catalog 6709. 46 p. —*Minneapolis-Honeywell Regulator Co., Industrial Div., Wayne & Windrim Aves., Philadelphia 44.*

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Electronic Controls

Information on system of electronic controls for heating, ventilating, and air conditioning. Bulletin F-6166. 8 p.—*Barber-Colman Co., Rockford, Ill.*

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Viscosity Recorder

Information on how to measure viscosity of catsup. Leaflet 200-21. —*Foxboro Co., Foxboro, Mass.*

Circle 239G on Reader Service Card

Test Instruments

Description and illustrations of line of portable high current test instruments. Catalog MA-154. 4 p.—*Multi-Amp Corp., 10 Third St., Newark 7, N. J.*

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Materials Handling

Fork Lift Trucks

Various models of fork lift trucks. Form D424-1 and 509. 4 and 6 p.—*Mobilift Corp., 835 S. E. Main St., Portland 14, Ore.*

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Truck Tanks

Construction features of truck tanks for delivery of petroleum products. Bulletin TT-52227.—*Heil Co., Hillside, N. J.*

Circle 239J on Reader Service Card

Power Conveyor

Descriptions and illustrations of continuous power conveyor and safe-rail. 64 p. catalog.—*Richards-Wilcox Mfg., Aurora, Ill.*

Circle 239K on Reader Service Card

Floor Trucks

13 models of floor trucks, with 5 types of tow mechanisms. Bulletin 54-T1. 8 p.—*Nutting Truck & Castor Co., 1470 W. Division St., Faribault, Minn.*

Circle 239L on Reader Service Card

Conveyor Belts

Typical applications of woven wire conveyor belts for continuous production processes. Bulletin 110. 4 p.—*Cambridge Wire Cloth Co., Cambridge, Md.*

Circle 239M on Reader Service Card

Truck Dumper

Description, photos and diagram of hydraulic truck dumper. Folder 2482. 4 p.—*Link-Belt Co., 301 W. Pershing Rd., Chicago 9.*

Circle 239N on Reader Service Card

Combination Unit

Uses of tractor-shovel unit for digging, carrying, feeding, loading and unloading. Form 264. 4 p.—*Frank G. Hough Co., Libertyville, Ill.*

Circle 239O on Reader Service Card

Vibrating Conveyor

Features of oscillating, vibrating conveyor especially suited for handling fine granular materials. Bulletin. — *Gifford-Wood Co., Hudson, N. Y.*

Circle 239P on Reader Service Card

All-Purpose Trailer

Description and photos of castor steer trailer suitable for "Trackless Train" system. Bulletin A-100. 4 p.—*Mercury Mfg. Co., 4044 S. Halsted St., Chicago 9.*

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Dock Ramp

Details of non-floating, hydraulic adjustable dock ramp with 20,000 lb. capacity. Data Sheet. —*Rowe Methods, Inc., 2534 Detroit Ave., Cleveland 13, Ohio.*

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Fork Truck

Detailed specifications and operation features, with photos, of 6000 lb. electric-powered fork truck. 4 p. folder.—*Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3.*

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Truck Operation

Cartoon presentation illustrating how to get most out of walkie-

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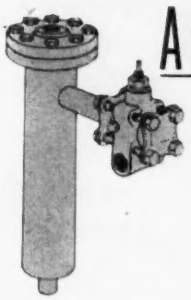

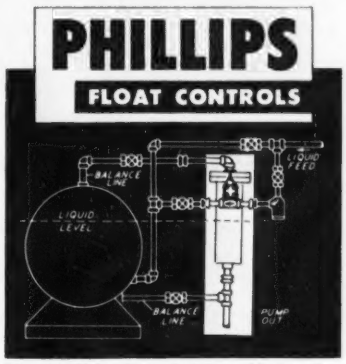

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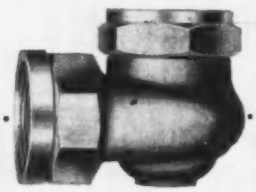

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type electric industrial truck. Bulletin P-1033. 16 p.—*Yale Materials Handling Div., Yale & Towne Mfg. Co., Roosevelt Blvd., Philadelphia 15.*

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Lift Trucks

Design, operation and maintenance of recently introduced fork truck featuring clutchless drive unit and special design transmission, with illustrations and drawings. Brochure SP-4008. 8 p.—*Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich.*

Circle 240A on Reader Service Card

Roller Conveyor

Data on light-weight, magnesium portable roller conveyors. Bulletin MRC-901.—*Mag Line Inc., Pinconning, Mich.*

Circle 240B on Reader Service Card

Handling Problems

Reference material on handling system for short distance hydraulic manipulation of materials too heavy for manual handling, yet not requiring motor-driven equipment. 20 p. pocket guide.—*Big Joe Mfg. Co., 900 W. Jackson Blvd., Chicago 7.*

Circle 240C on Reader Service Card

Plant Supplies

Laboratory Demineralizer

Description of recent model cartridge demineralizer with aluminum mounting bracket or accessory stand. 6 p. leaflet.—*Penfield Mfg. Co., Inc., 19 High School Ave., Meriden, Conn.*

Circle 240D on Reader Service Card

Spraying Systems

Extensive reference material on industrial spray nozzles with illustrations and dimensional specifications as well as information on related equipment. Catalog 24. 48 p.—*Spraying Systems Co., Randolph St., Bellwood, Ill.*

Circle 240E on Reader Service Card

Cleaning Supplies

Line of various items for cleaning and maintenance with illustrations and description. Bulletin F-55315. 40 p.—*Cherry-Burrell Corp., 427 W. Randolph St., Chicago 6.*

Circle 240F on Reader Service Card

Corrosion Protection

Description of system of cathodic protection for elimination of corrosion in cold water tanks, condensers, feed water heaters, etc. 4 p. brochure—*Kirkaldy System, 425 Hamilton Ave., Brooklyn 32.*

Circle 240G on Reader Service Card

Plastic Tubing

Characteristics and uses of all-purpose plastic tubing with unusual flexibility and clear transparency. Bulletin 66-D. 4 p.—*American Hard Rubber Co., 93 Worth St., New York City 13.*

Circle 240H on Reader Service Card

Floor Bricks

Information and specifications covering use of vitrified paving brick for industrial floors with instructions for laying. 14 p. brochure. — *Metropolitan Brick, Inc., Canton 2, Ohio.*

Circle 240I on Reader Service Card

Teflon Applications

17 new successful applications of Teflon finishes, deriving from its release or anti-sticking property, high corrosion and heat resistance, and low friction coefficient. 12 p. revised bulletin.—*Du Pont Finishes Div., Room D-7145, Wilmington 98, Del.*

Circle 240J on Reader Service Card

Fire Pumps

Specifications and illustrations of vertical turbine fire pumps, adaptable to variety of drives. Bulletin W-450-B42. 6 p.—*Advtg. and Sales Promotion Dept., Worthington Corp., Harrison, N. J.*

Circle 240K on Reader Service Card

Safety Equipment

Descriptions and illustrations of models of dust respirator, safety goggles and plastic clothing. 4 p. leaflet.—*Pulmosan Safety Equipment Corp., 644 Pacific St., Brooklyn 17.*

Circle 240L on Reader Service Card

Cork Products

Physical characteristics and uses for natural cork and cork compositions with illustrations of products made from each. Bulletin S-54. 4 p.—*Dodge Cork Co., Inc., Lancaster, Pa.*

Circle 240M on Reader Service Card

Silver Brazing

Information on applications and advantages of silver alloy brazing for pipes and tubing. Bulletin 61. 4 p.—*Handy & Harmon, 82 Fulton St., New York City 38.*

Circle 240N on Reader Service Card

Tee Connections

Information on making branch connections to highly stressed transmission and distribution lines without interruption of fluid by means of specially designed hot tap tee connections. Bulletin 533. 54 p.—*Taylor Forge & Pipe Works, P. O. Box 485, Chicago 90.*

Circle 240O on Reader Service Card

Floor Repairer

Floor repair material that bonds to concrete, brick, stone and asphalt to eliminate ruts and holes in exterior or interior surfaces. Folder.—*Stonhard Co., Dept. SF,*

1306 Spring Garden St., Philadelphia 23.

Circle 240P on Reader Service Card

Alloy Products

Illustrated information on wrought products of aluminum bronze alloys. Bulletin WP-1a. 14 p.—*Ampco Metal, Inc., 1745 S. 38th St., Milwaukee 46.*

Circle 241A on Reader Service Card

Insecticide Line

Four improved insecticidal products designed for use in dairy and food industries. Folder.—*Klenzade Products, Inc., Beloit, Wis.*

Circle 241B on Reader Service Card

Adhesive Seal

Features of inner paper seal imprintable liners for closures. 4 p. folder.—*Crown Cork & Seal Co., Closure Div., Baltimore 3.*

Circle 241C on Reader Service Card

Industrial Insulations

Description and illustrations of Fiberglas industrial insulations for use at temperatures from sub-zero to 1200 deg. F. 16 p. brochure. —*Owens-Corning Fiberglas Corp., P.O. Box 89, Santa Clara, Calif.*

Circle 241D on Reader Service Card

Hose Shut-Off

Mechanism for quick, efficient water control for use on 1½, 2½, and 3 in. double-jacket hose. Leaflet. — *American LaFrance-Foamite Corp., Elmira, N. Y.*

Circle 241E on Reader Service Card

Carton Tape

Advantages of use of tear strip tape in sealing corrugated cartons, with illustrations. Bulletin P-WTC(1050.5). 6 p.—*Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul 6, Minn.*

Circle 241F on Reader Service Card

Miscellaneous

Industrial Locations

Facts and figures on areas or communities from the point of view of locating new industries. Elaborate illustrated plastic brochure. — *Pennsylvania Dept. of Commerce, Harrisburg, Penn.*

Circle 241G on Reader Service Card

Refrigeration Systems

Features and installation data on package truck refrigeration systems. 4 p. illustrated booklet.—*Eldon Miller Co., E. Main St., Gary, Ind.*

Circle 241H on Reader Service Card

Maintenance System

Description of system to assist in planning and scheduling of maintenance management, with recommendation of tools needed. Folder KD 259. 8 p.—*Remington Rand, 315 Fourth Ave., New York City 10.*

Circle 241I on Reader Service Card

Pump Care

Practical tips on installing, operating, and maintaining vacuum pumps and vacuum systems. 16 p. handbook.—*F. J. Stokes Machine Co., 5500 Tabor Rd., Philadelphia 20.*

Circle 241J on Reader Service Card

Research Supply List

Listing of 600 items of interest to research workers in biology, bacteriology. Biochemistry and nutrition. Folder 677. 58 p.—*General Biochemicals, Inc., 677 Laboratory Park, Chagrin Falls, Ohio.*

Circle 241K on Reader Service Card

Oiling System

Information on low cost, automatic central method of lubrication with supplementary pamphlets on solenoid operated oiler and valve brush assemblies. Bulletins 69-30-69-31, and 68-72.—*Oil-Rite Corp., 2306 Waldo Blvd., Manitowac, Wisc.*

Circle 241L on Reader Service Card

Educational Film

18-minute black and white film on use of expanded polystyrene plastic for low temperature insulation. *Merchandising Sec., Plastics Sales Dept., Dow Chemical Co., Midland, Mich.*

Circle 241M on Reader Service Card

Ion Exchange

Fundamentals and answers on ion exchange processes and technology with two-color drawings. Bulletin IE-3-53. 16 p.—*Rohm & Haas Co., Resinous Products Div., Washington Sq., Philadelphia 5.*

Circle 241N on Reader Service Card

Packaging Material

Group of leaflets in folder featuring plastic packaging material and information on printing and fabricating of all types of bags or sheets.—*Arvey Corp., 3462 N. Kimball Ave., Chicago 18.*

Circle 241O on Reader Service Card

Free Literature—Fast Way

Any of these very-latest catalogs, bulletins, or folders will be sped to you gratis. Just note here the specific literature you want, then circle each key number (there's one given at the bottom of each item) on the handy Reader Service postcard—page 177. Then sign at the bottom and mail.

For your convenience, too, all items in this department are listed and keyed in the Reader Service Section.

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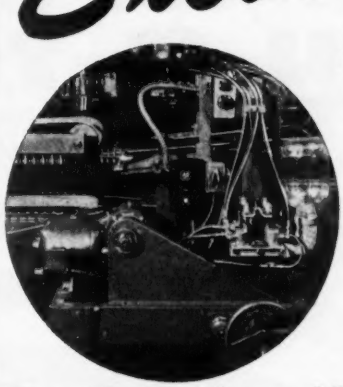

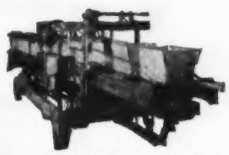

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You a target?

Let's face it . . . we're all targets!

If your plant is not ready with a disaster plan, better act now. There's not a single American plant that's out of range of an intercontinental bomber—and fires, floods, tornadoes or explosions can kill you just as dead as an atom bomb.

It costs next to nothing to take a few simple steps which may save hundreds of lives. Here they are. Check them off today.

☐ **Call your local** Civil Defense Director. He'll help you set up a plan for your offices and plant—a plan that's safer, because it's integrated with community Civil Defense action.

☐ **Check contents** and locations of first-aid kits. Be sure they're adequate and up to date. Here, again, your CD Director can help. He'll advise you on supplies needed for injuries due to blast, radiation, etc.

☐ **Encourage personnel** to attend Red Cross First-Aid Training Courses. They may save your life.

☐ **Encourage your staff** and your community to have their homes prepared. Run ads in your plant paper, in local newspapers, over TV and radio, on bulletin boards. Your CD Director can show you ads that you can sponsor locally. Set the standard of preparedness in your plant city. There's no better way of building prestige and good community relations—and no greater way of helping America.

Act now . . . check off these four simple points . . . lives are at stake . . . have you a right to delay?

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Write for bulletin describing facilities and services

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Write for Price Schedule

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are live opportunities in the field of food processing and distribution.

Each announcement represents a current Want or Offering of an organization or individual in the field, with some element of profit in each for whoever can fill the need. Some have money-saving possibilities, others are opportunities for more business; many are employment opportunities; still others offer property, or equipment—used or surplus new equipment.

"Searchlight" advertisements are constantly changing. New opportunities are constantly finding their way into this great Want medium, each issue. Regular reading of the "Searchlight" pages can be as important to you as reading the editorial sections; Editorial matter is NEWS OF OPPORTUNITIES offered in the industry.

for EVERY business WANT
"Think SEARCHLIGHT first"

WHERE TO STORE FROZEN FOODS

INGREDIENTS FOR THE FOOD PROCESSOR

QUAKER CITY COLD STORAGE CO., INC.
PHILADELPHIA, PA.
3 WAREHOUSE LOCATIONS
Proper Temperature for Frozen Foods

New Advertisements

received by May 26th will appear in the June issue subject to limitation of space available. Address copy to the

FOOD ENGINEERING

330 W. 42nd St., New York 36, N. Y.

CARROT OIL makes food golden yellow

Carrot oil, like butter, contains carotene. Carrot oil is extracted from carrots, and each pound contains up to 25 million units of carotene, the international standard of vitamin A.

Carrot oil is preferred for vitaminizing foods because it is a natural vegetable oil and because it contributes vitamin A of high stability and desirable golden yellow color. Carrot oil is not synthetic, does not contain animal fats of any kind, and does not produce fishy flavor.

SEND FOR BOOKLET

New 36 page combined catalog on carrot oil for foods, feeds, and pharmaceuticals. Important reading for most food processors. Write today!

NUTRITIONAL RESEARCH ASSOCIATES
205 Broad St., South Whitley, Ind.

MACHINE DESIGN ENGINEER

Old Philadelphia area large stable Mfg. offers graduate mechanical engineer or equivalent, experienced in machine design, a position in Development Engineering. Engineer must originate designs and develop automatic and semi-automatic machinery to be used in company's production processes. In addition to excellent salary opportunities the company offers stability of employment and exceptionally liberal benefits. Qualified men under 45 should send resume to

P-2615, Food Engineering
330 W. 42 St., New York 36, N. Y.

WANTED
CEREAL CHEMIST WITH PRE-MIX EXPERIENCE.

Due to expansion it is necessary to add a Cereal Chemist to our present laboratory staff, who has specialized chemical training in cereal chemistry and is thoroughly experienced in Pre-mixes. Laboratory and mill experience in flour and cereal products very beneficial.

If qualified and interested, write immediately, outlining qualifications, to the Personnel Department, Lindsey-Robinson & Company, Inc., Roanoke, Virginia, Manufacturers of Fair-Acre Feeds, Corn Meal, Gambill's Flour and Pre-mixes.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

FOOD CHEMIST and Technologist. Excellent opportunity in laboratory of Western New York State canning and freezing company. This position offers a real challenge to a man interested in making a career for himself in the food field. Prefer young man not over 30. Work to start June 1st when construction of new laboratory will be completed. P-2293, Food Engineering.

PRODUCTION MAN wanted. Experienced in the manufacture of Bakers Supplies & Fountain Fruits. Wonderful opening for aggressive man who is looking for a secure future. Give all details and reference to age, experience, present situation and income; and all other pertinent information. All replies held in strictest confidence. P-2393, Food Engineering.

WANTED—FOOD technologist. Recent graduate, or with 2-years' experience. Nationally known food company located in Western New York. Work in quality control at start, with possible openings in plant operations. Write fully, giving complete details. P-2448, Food Engineering.

EMPLOYMENT SERVICE

SALARIED PERSONNEL $3,000-$25,000. This confidential service, established 1927, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. F, 241 Orange St., New Haven, Conn.

POSITIONS WANTED

PRODUCTION MANAGER, 25 years experience in manufacturing products for grocers, institutions, confectioners and bakers. Jellies, marmalades, preserves, syrups, spreads, fudge bases, glace fruits and specialties. Costs control, work, handling personnel, duplicating and developing. Available immediately. Reply to PW-2591, Food Engineering.

SEARCHLIGHT SECTION

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$1.50 A LINE, MINIMUM 3 LINES. To figure advance payment count 5 average words as a line.

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The advertising rate is $13.25 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

Individual Spaces with border rules for prominent display of advertisements.

Send NEW ADVERTISEMENTS to N Y Office, 330 W. 42 St., N. Y. 36, for June issue closing May 26th

TECHNICAL EDITOR WANTED

Top-ranking magazine for food manufacturers and processors has position open for Assistant Editor age 25 to 35. Requirements are degree in food technology, food engineering, or chemical engineering, and minimum of 4 years technical experience with food or food equipment company. Must enjoy technical writing, but professional experience not necessary. Job involves writing, editing, some travel, plant visits, and coverage of meetings. Location New York.

P-2645, Food Engineering
330 W. 42 St., New York 36, N. Y.

WE NEED!
FOOD TECHNOLOGISTS and FOOD CANNING CANDIDATES —junior to top-level.

Call, write or wire:
Gladys Hunting (Consultant)
Employment Counsel, Inc.
7 W. Madison St. Chicago 2, Ill.

POSITIONS WANTED

FOOD TECHNOLOGIST, multiple products. Executive level. PW-2577, Food Engineering.

CHIEF ENGINEER: Young P.E. 15 years top-flite experience management, chemicals, spraydrying, packaging, plant design. Ethical, can obsolesce trade secrets in highly competitive chemicals & food. PW-2546, Food Engineering.

SANITARY ENGINEER: 29; BSCE; 4 years experience public health; industrial water & wastes treatment; industrial sanitation; by-product processing. PW-2318, Food Engineering.

PLANT ENGINEER-P.E. New York; M.E. 10 years broad food industry experience for large food chain including canning, packaging, processing, frozen. Qualified supervise layout, construction, operation, maintenance with progressive organization. For resume write PW-1850, Food Engineering.

RESEARCH DEVELOPMENT or Administration. Ph.D. Physical chemistry, age 39, 12 years diversified experience in food and dairy science and technology, chemical additives, surface active agents, carbohydrates. Desires responsible position with future. Publications. Patent pending. N.Y., N.J., New England preferred. PW-2522, Food Engineering.

BEVERAGE CHEMIST—College (Chemical) background—seven years experience production of carbonated beverages and syrups.—Made own extracts and emulsions—Experienced in canning procedures, pasteurization, dietetic drinks, state and Federal Food laws. Prefer eastern location. PW-2642, Food Engineering.

BUSINESS OPPORTUNITIES

A Canning Factory near Toronto, Can., is open to negotiate with any U. S. Manufacturer who wishes to expand by having his product manufactured in Canada for the Canadian trade. BO-2480, Food Engineering.

Reliable Canadian food company in new plant desires contacts for packing and merchandising or packing only advertised U. S. food product with merit. Reply with full details. Box BO-2640, Food Engineering.

For Sale: Tuna fish cannery Azores, Portugal Write: cipher PV 32334L Publicitas Lausanne (Switzerland).

FOOD PLANT WANTED
We are now manufacturing over $20,000,000 in various lines and wish to expand by acquisition of assets of stock of one or more industrial companies. In our negotiations the sellers' problems and wishes will receive full consideration. Present personnel will normally be retained.
Address all replies
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233 Broadway, N. Y. 7, N. Y. BA 7-1819

WANTED
TO EXPEDITE PRODUCTION

Food Processing Equipment including Aluminum and S/S Kettles, Mixers, Vacuum Pans, Dehydration equipment, Grinders, Elevators, Stills, Colloid Mills, Conveyors, Filters, Packaging Units, Wrapping Machines. Will consider a set up plant now operating or shut down. When offering give full particulars.

P. O. Box 1351
Church Street Sta., New York 8, N. Y.

EQUIPMENT WANTED

One used Gaulin laboratory homogenizer with two stage valve assembly, gauge, and motor. One Fitzpatrick comminuting machine. Reply

W-2437, Food Engineering
520 N. Michigan Ave., Chicago 11, Ill.

***Wanted;* to lease or purchase**
LABORATORY SIZE
VACUUM DRUM DRYER OR SPRAY DRIER—

W-2572, Food Engineering
520 N. Michigan Ave., Chicago 11, Ill.

FOR SALE
10 STAINLESS (Through Out)
STEEL HOLDING TANKS WITH COVERS
With Paddle Type Agitators
500 Gallon Cap.
Motors, Drive Controls, Etc., Complete
MIDBRO COMPANY
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Lot glass lined tanks cap. 1,000 to 15,000 gal. Bowser 160 sq. ft. of powder filter. Food Machy. can checkweight machine 300 c. p. m.

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1039 Parkside Drive Lakewood, Ohio

If there is anything you want
or something you don't want that readers can supply—or use—advertise it in the
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. . . IS THE BEST BUY

SEE THESE VALUES!

1—Sharples DH2 Nozljector 316 SS.
1—Sharples P14 Super-D-Canter 316, SS.
1—Fletcher 40" SS Suspended Centrifugal.
1—Bird 40" 347 Stainless Suspended Centrifugal.
1—2800 gallon 316 stainless steel Tank.
2—Aluminum Vertical Tanks 2300 gallons.
2—Hersey 3' x 26', 4' x 30' stainless steel Rotary Dryers.
2—Link Belt 2'7" x 8', 3'10" x 16' Roto-Louvre Dryers.
4—Devine Vacuum Dryers 4, 6 and 20—40" x 43" shelves.
3—Stokes 18" x 42", 30" x 8', 3' x 15' Rotary Vacuum Dryers.
1—Baker Perkins 300 gal. S.S. Sigma Blade Mixer.
2—Pfaudler 100 gallon, glass-lined jacketed Stills.
4—Buflovak 5' x 12', 42" x 90", 32" x 52" and 24" x 36" double drum Dryers.
2—Green 150, 125 gallon, stainless steel, agitated, jacketed Kettles.
5—Mikro Pulverizers #2TH, #2DH, #1SI, #1SH and Bantam.
1—Robinson 4000# Heavy Duty Mixer.
6—Rotex 40" x 120", 40" x 84", 20" x 48' single and double deck Sifters.
3—Sprout Waldron 40' x 84" single deck, stainless steel Sifters.
1—Sperry 24" Aluminum P & F Filter Press.
3—Sweetland Filters #7, #10, #12.
6—Oliver Rotary Filters 4'x5', 5'x5', 8'x8', 8'x10', 8'x12'.

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Tel: CYpress 2-5703 - Cable: Briston, N. Y.

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100 gal. Copper Steam Jacketed Mixing Kettle
York Freon Compressor with 1½ H.P. 3 phase motor
Burns Split Nut Peanut Blancher

SAVAGE BROS. CO.
2636 Gladys Ave. Chicago 12, Ill.

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Built 1946-47—Never used

LOUISVILLE ROTARY STEAM TUBE DRYER, 6' x 40'
LOUISVILLE 8-ROLL DEWATERING PRESS, 36"
LOUISVILLE ROTARY PADDLE SCREEN, 36" x 18'
DOUBLE DRUM DRYER 24" dia. x 60" long
CONKEY TRIPLE EFFECT EVAPORATOR Herculoy construction
1st effect—Forced circulation —500 sq. ft.
2nd effect—Natural Recirculation —700 sq. ft.
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1411 N. Sixth St., Philadelphia 22, Pa.

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• REBUILDING SHOPS etc.

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Meats
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Candy
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FRED R. FIRSTENBERG, President

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209-289 TENTH ST. BROOKLYN 15, N. Y.
Phone: STerling 8-4672

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WITH IMMEDIATE DELIVERY

of GOOD USED EQUIPMENT

1—Read-Standard Horiz. Ribbon Mixer, 2000#, 480 gal. Practically new; other sizes 1000# to 100#.
3—#12 Sweetland Filters, 48 bronze Monel covered leaves, 3" c.c.
1—Pfaudler G. L. jacketed Kettle, XP Motor, 200 gal.
1—Monel Enzinger Filter, jack. 8 lvs.
1—B. P. "Ter-Meer" Contin. S.S. Centrifugal, 12" basket. XP Motor.
3—Devine # 28 Vacuum Shelf Dryers, ea. 20 Shelves 59' x 78" Complete.
1—300 gal. Stainless jacketed, agitated Reaction Kettle.
1—S.W. 5' x 10' Stainless single Drum Dryer, 100#, M.D.
1—Oliver Rotary Filter, 6' x 6', Acid Construction.
4—Mojonnier, S.S. Vac. Pans, 3', 5', 6'.
1—Sperry 24" x 24" C.I. Pl. & Frame, 25 chambers, 2" cake.
12—Sperry 18" x 18" cast iron Filter Presses, P. & F., 11 chambers.
3—6' x 50' Louisville Rot. Tube Dryers.
1—Day size 30 Imperial jacketed 75 gal.
3—Mikro Pulverizers, 2TH, Ban. SH.
4—Buflovac Atmo. Dbl. Drum Dryers, 32" x 72", 32" x 90", 42" x 120".
3—Anco 4' x 9' Chilling Rolls.

Only a Partial Listing

Send Us Your Inquiries

WANTED

YOUR SURPLUS MACHINERY OR PLANTS . . .

SEND US YOUR LIST TODAY . . .

Our 37th Year

CONSOLIDATED PRODUCTS COMPANY, INC.

56 BLOOMFIELD STREET

HOBOKEN, N. J. Tel: HOboken 3-4425

N. Y. Tel: BArclay 7-0600

FOR SALE

8—Devine Vac. Shelf Dryers 17 & 20 Shelves 59" x 78".
1—Resina Type "LC" Screw Capper.
1—Standard 429 Gluer & Sealer.
3—Lee 300 Gal. S.S. Jack. Kettles.
1—Bird 48" Sus. Style S.S. Cent.
1—Chrome Van. Steel Autoclave 110 Gals. 2000 psi.
1—Buflovak 6' Vac. Crystallizer.
7—Sperry Filter Presses 24"—12 to 40 Ch. 1" & 2" Cake—Hyd. Closures.
1—Sweetland #12 Filter 72 Brze. Leaves.
2—Vert. S.S. 6,000 Gal. Tanks, Closed.
3—Mixers Jack., Double Arm 15-20-250 Gals.
2—St. Regis Bag Fillers type 100LS.
4—Rubber Lined Tanks 3500 Gal. & 39,000 Gals.
1—Keeler CP 350 H.P. Boiler.
5—Retorts 40 x 72 and Baskets.
3—Fillers 3-4 and 10 Piston S.S.
New Horizontal Spiral Mixers 1000 to 3000# Steel and S.S.

Above listings partial only. Send for Bulletin #33. We buy single items or complete plants.

THE MACHINERY & EQUIPMENT CORP.

533 West Broadway, New York 12, N. Y.
GRammercy 5-6680

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STAINLESS STEEL TANKS

2—6000 gal. Vert.—Used
1—5700 gal. Horiz. T304—UNUSED
2—5000 gal. Vert.—Used
1—3000 gal. Vert.—UNUSED
1—3000 gal. Horiz.—Used
1—2800 gal. Horiz.—Used
1—2000 gal. Vert.—UNUSED
1—1600 gal. Vert.—UNUSED
3—1000 gal. Vert.—UNUSED
20—from 15 gal. to 500 gal. sizes

STAINLESS STEEL JACKETED KETTLES

1—500 gal. 54" I.D. x 55" H.
2—450 gal. Agitated, cone bottom
1—200 gal. Readco Dbl. motion agit.
1—150 gal. Dbl. motion agit.
4— 65 gal. Pfaudler—UNUSED
6— 50 gal. Lee, tilting, 125# pr.

ALSO—stainless steel columns, heat exchangers, condensers, filters, etc.

PERRY EQUIPMENT CORP.

1411 N. 6th St. PHILA. 22, PA.

WE HAVE IN STOCK
FOR IMMEDIATE DELIVERY
THE FOLLOWING TYPES OF EQUIPMENT

BOILERS
CANNING
CONFECTIONERY
DAIRY
FILLERS
MATERIAL HANDLING
STAINLESS STEEL JACKETED KETTLES
MEAT PACKING
MIXERS
MOTORS
PULVERIZERS
PUMPS
REFRIGERATION
SCALES
STAINLESS-STEEL TANKS
LARGE & SMALL STEEL TANKS

Consult Us for Your Food Processing Equipment
Send Us Your Inquiries
We Buy One Item or Entire Plants

AARON Equipment Company

1347 So. Ashland Ave., Chicago 8, Illinois
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THREE STEAM COOKERS

56" O.D. by 6'-11" long of 40# working pressure and tested for 80# pressure. Cookers complete with stands. Available for immediate delivery. Inspection at our plant.

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COMPLETE MAYONNAISE PLANT

consisting of

1—6" U3 Premier Mill Homogenizer
1—#10 1" Stainless steel Waukesha pump
1—100 gal Pfaudler S.S. Premix mixer with 2 H.P. Motor
1—50 gal glass lined oil tank and complete electrical controls cost us $3652.00, excellent condition as used very little. $1200.00

GEO. BOARDMAN & BRO.
35 4th Ave., Albany, N. Y.

FOR SALE

(TWO) Atmospheric double drum dryers

32" x 72" and 32" x 100". Complete with conveyors, elevators, hoods, and motors. Excellent condition, available for personal inspection.

FS-2214, Food Engineering
520 N. Michigan Ave., Chicago 11, Ill.

NEW — MOJONNIER FILLER FOR SALE

Brand new, never used Model 155 vacuum filler, 24-spout, stainless construction, attachments for 4 5 quarts, complete with all accessories. Immediate delivery, price 50% off.

FS-2599, Food Engineering
330 W. 42 St., New York 36, N. Y.

300' CONVEYOR AVAILABLE

300' new and slightly used gravity conveyor for boxes, cases, cartons; with stands and endless belt boosters.

FS-2601, Food Engineering
330 W. 42 St., New York 36, N. Y.

LATE-TYPE PROCESS EQUIPMENT
Reduced For Quick Sale

UNION Rebuilt Machinery Established 1912

Elgin 24-Head Rotary Vacuum Filler.

Capem 1SF 4-Head Auto. Capper.

Kyler A, Burt adj. Wraparound Labelers.

Baker Perkins BB, Unidor (Vacuum) 4 to 200 gal. Double Arm Jacketed Mixers, Sigma or Fish Tail Blades.

Day, Robinson Dry Powder Mixers and Sifters, 200, 600, 1500, 10,000 lbs.

850 gal. Steel Vertical S.J. Mixer, M.D.

Day 650 gal. Jacketed Jumbo Mixer.

Day, New Era, Hottman Mixers 2 to 3500 gals. with/without Jackets, Single and Double Arm Agitators.

Fitzpatrick "D" Stainless Steel Comminuter, with and without auto. screw feeds, jacket chamber.

Mikro 4TH, 3W, 1SH, Bantam Pulverizers; Schutz O'Neill Mills.

Tyler Hummer #27 2-Deck Sifter.

F. J. Stokes Rotary Tablet Machine.

Colton 2, 3RP, 4 Tablet Machines.

Stokes & Smith A and B Transwraps.

Stokes & Smith G1, G2 and HG88 Duplex Auger Fillers.

Whiz Packer and Triangle Vol. Fillers.

Triangle Package Models A3, G2C, G2S, A6CA, Elec-Tri-Pak Fillers.

Horix 14-Head Rotary Filler.

Pfaudler King C9 Stainless Steel Rotary Gravity Filler.

Filler 4, Hope 6 S.S. Piston Fillers.

Doughboy, Amsco Rotary Bag Sealers.

American Can O-8 Rotary Can Closer.

Standard-Knapp No. 429 Carton Sealer.

Hayssen; Package Machy. Co. FA, FA4, DF, CA2; Miller, Scandia and Oliver Automatic Cellophane Wrappers.

Sperry 12" S.S. P and F Filter Press.

Pneumatic Automatic Cartoning Unit, 60 and 30 per min.

Additional Information and Quotations Available on Request
Write Today or Wire Collect

UNION STANDARD EQUIPMENT CO.
318-322 Lafayette Street New York 12, N. Y.

TOP PRICES PAID FOR YOUR SURPLUS EQUIPMENT

FOR SALE

APV Heater, 8 pair S.S. Plates, 200 g.p.h.
275 gal. S.S. Tank, 42" x 48".
75 gal. Monel Jktd. Kettle, 35" x 27", agit.
100 to 300 gal. S.S. Mix Tanks, water jkt.
200 gal. Pfaudler Glass Lined Tank, water jkt.
5 ft. Rogers S.S. Vacuum Pan.
32" x 52" & 36" x 120" Double Drum Dryers.
26" Centrifugal Extractors, 3 H.P.
75 to 1500 gal. Homogenizers or Viscolizers.
3000 gal. S.S. Truck Tanks, Trailerized.
A.B.C. Carton Compression Unit.
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3 Ton Clark Fork Lift Truck, solid tires.
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Milk Pasteurizers, Coolers, Fillers, Washers.

Send us your inquiries

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– FOR SALE –

8—Groen Stainless Steel Jacketed Kettles, 80 gallons each.

2—Stainless Steel Jacketed Vacuum Kettles, 500 gallons each.

2—Stainless Steel Jacketed Vacuum Kettles, 300 gallons each.

1—Pfaudler glass lined Jacketed Reactor, 30 gallons.

1—Pfaudler glass lined Jacketed Reactor, 100 gallons.

1—Link Belt Steel Roto Louvre Dryer 7½' x 20'

1—Sharples Type 316 Stainless Steel Super D Hydrator Model C-20.

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VACUUM PAN: Henszey 36" stainless steel.
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MIXERS: Sgl. and Dbl. arm, jkt., plain.
EVAPORATOR: Conkey 60 sq. ft., s. st.
POWDER MIXERS: 100 to 2000 lb. capacities.
KETTLES: Savage 50 gal. st. steel, tilt back, dbl. act. agitators, 125 psi.
KETTLES: Stainless steel, 20 to 100 gallons.
KETTLE: 20 gal. s.s. jktd., gas fired.
DRYER: Devine Vacuum Drum 2'x4', st. steel.
DRYER: Louisville s.s., pilot plant size.
CARTON SEALERS: Ceco model 3901.
LABELERS: New Jersey, Burt, Knapp, World.
FILTER PRESSES: 7" to 24" sizes.
PISTON FILLERS: Geyer, Elgin, Kiefer, M&S.
LIQUID FILLERS: Vacuum and Siphon types.
PREHEATER: Double row 14 s.s. tubes 10' lg.
DOPP KETTLES: 200 gal. jktd. iron.
POWEDER FILLERS: Triangle, Stokes & Smith, Edtbauer, Weighrite.
SCREENS: Rotex and Roball 20x48", 40x84".
COOKERS and COOLERS: Lee 100 gal. st. stl.
HAMMER MILLS: Williams, Prater, Raymond.
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PNEUMATIC HIGH SPEED Cartoning Line, consisting of: Automatic Feeder, Bottom Sealer, Filler, Top Sealer & Compression Unit.

PNEUMATIC SCALE CO. Large and Small Liners.

PNEUMATIC SCALE CO. Tightwrap, High Speed.

PNEUMATIC SCALE CO.—WORLD and PONY fully automatic and semi-automatic labelers, 60-120 per minute.

PNEUMATIC SCALE CO., CONSOLIDATED AND RESINA fully automatic Cappers, 1, 3 and 4 Head.

STANDARD-KNAPP Model 429 Case Sealer and Compression Unit.

STANDARD-KNAPP Case Loader and Unloader.

STOKES & SMITH model HG84, Twin Auger Filler with Vacuum Attachment, Also Models G and GD.

Partial List—send for complete list of equipment in stock

WANTED

PNEUMATIC SCALE CO. automatic feeders and bottom sealers. Medium or high speed. Will also purchase complete lines.
PACKAGE MACHINERY CO. Model FA or FAQ cellophane wrappers.

ALLIED EQUIPMENT CO.
940-946 Nepperhan Ave., Yonkers 3, N. Y.
Phone: Yonkers 5-0442

Huron salutes Mrs. Paul's Kitchens... leader in frozen prepared seafoods

Mrs. Paul's Kitchens has been a pioneer and a leader in the frozen prepared seafood industry for the past several years.

This company, which operates four large processing centers in Pennsylvania, Maryland and New Jersey, has consistently been the most aggressive advertiser and merchandiser in this field. Maintaining a firm policy of providing the highest quality in their products and selling at prices which assure high profit and rapid turnover for retailer and distributors, Mrs. Paul's Kitchens has become a leading brand of prepared frozen seafood products.

These products are all made from the finest ingredients available. The frozen deviled crabs are made from fresh, white lump crabmeat, dairy-fresh butter, Grade A homogenized milk. Only a special type of fish taken from the iciest, deepest waters of the North Atlantic is used in preparing Mrs. Paul's FISH STICKS. This insistence on the freshest, highest quality ingredients for all of their products has been a major factor in the rapid growth of Mrs. Paul's Kitchens. And we at the Huron Milling Company are proud of the contributions we have made to the success of this company by supplying them with the monosodium glutamate used to enhance the taste of these fine products.

We salute Mrs. Paul's Kitchens for their leading role as the pioneers in the frozen prepared seafood industry . . . for giving American housewives a wide variety of frozen prepared seafoods. Their slogan, "Just heat 'em and eat 'em . . . you'll love 'em", more than expresses the convenience and appeal of these fine products to consumers everywhere. Huron Milling Company, 9 Park Place, New York 7, N.Y.

Mrs. Paul's frozen prepared seafoods include the following products:

- Frozen Deviled Crabs
- Frozen Fried Fish Sticks
- Frozen Seafood Dinner
- Frozen Fried Fish Fillets
- Frozen Fried Scallops
- Frozen Fried Shrimp
- Frozen Cod Fish Cakes

B.3.64

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PURE MONOSODIUM GLUTAMATE 99+%

Made by the American pioneers in protein derivatives

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So good to know at this time that the product is starting out right in containers which guard against damage down the line. Developed with the same care as you give your product, Gaylord Boxes combine proved design with quality board to give you superior protection.

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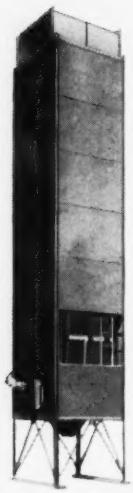
COAST-TO-COAST

CORRUGATED AND SOLID FIBRE BOXES • FOLDING CARTONS • KRAFT PAPER AND SPECIALTIES • KRAFT BAGS AND SACKS

New *simplicity and sustained efficiency in dust filtering and collection...*



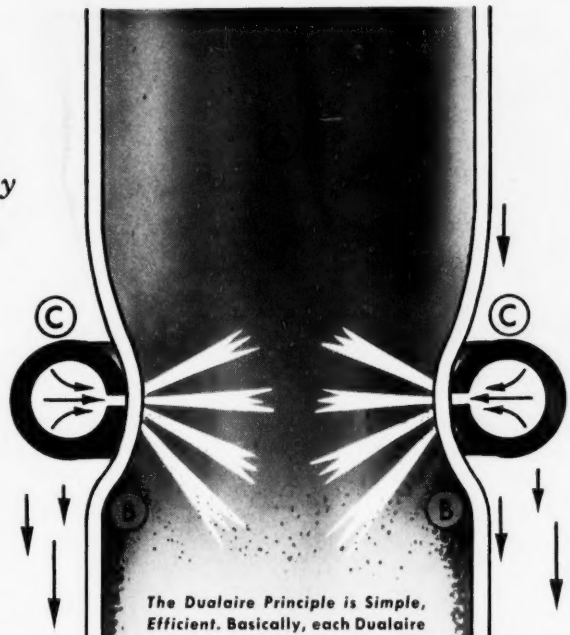
Dualaire*

REVERSE-JET DUST COLLECTOR

Efficiencies up to 99.99%

Cloth filter systems of one design or another have long been used by industry for cleaning industrial gases and/or recovering dust or other suspensions. But three problems are common to such systems... (1) Extreme changes in pressure drop and filtering efficiency as dust cakes accumulate on the filter surface... (2) Wide pressure fluctuations and surges in the plant system as filter units become clogged or are cut out and rapped for cleaning... and (3) Rapid deterioration of the filter material by the vibration, shaking and rapping equipment used for cleaning.

But now the DUALAIRE Collector—as engineered by Western Precipitation, pioneers in the field of dust recovery—provides the answer to these and other problems common to conventional bag-house equipment.



The Dualaire Principle is Simple, Efficient. **Basically, each Dualaire filter unit consists of a cloth or felt tube, open at both the top and bottom. (A) Dust-laden gases enter at top of the tube and are filtered as they pass through the side walls of the tube to the exhaust system. (B) Dust particles collect on the inside of the tube and *before* the cake builds up sufficiently to affect filter operation, a tubular blow ring (C) automatically starts moving up and down the outside of the filter cylinder. A jet of air, concentrated by this blow ring, reverses the normal gas flow at the point contacted by the ring, thus jetting the dust layer off of the inner surface of the filter tube.**

This jetting action is further assisted by a flexing of the filter cylinder as the blow ring passes, thus cracking and loosening the dust layer from the inner surface, from where it drops to the recovery chamber below the bottom of the tube.

The entire operation is positive and simple. The blow ring starts its action *automatically* as soon as the dust layer causes a pre-determined pressure differential. And after the filter surface is cleaned, the blow ring *automatically* stops.

6 ADVANTAGES OF DUALAIRE DESIGN...

PRESSURE DROP remains uniformly low at all times because the dust is removed continuously in *small portions.*

FILTERING EFFICIENCY remains uniformly high at all times without the "choking" action characteristic of conventional bag-houses. Actual field tests show efficiencies as high as 99.99%!

DUST RECOVERY is in steady increments — not in sudden large "batches" as with conventional rapping systems. Thus the Dualaire eliminates surges and detrimental variations in the plant system.

FILTER ELEMENT has a much longer life because it is not subjected to the stresses of rapping or jarring while being cleaned. Dualaire reverse-jet cleaning action is gentle, yet far more effective.

GREAT SAVINGS are also made in space and the size of installation required. Because each Dualaire filter unit is cleaned more-or-less constantly without shut-down, there is no need for costly standby units — or the complicated switching equipment to cut standby equipment in and out.

BASIC UNITS are "sectionalized" and are available in 5 standard heights. Sections can be bolted together in any desired multiple, providing a capacity range to fit virtually any requirement. As needs increase, add more sections.

There are many other advantages built into the DUALAIRE. *For further details send for this descriptive 12 page booklet. Or contact your nearest Western Precipitation representative!*

* ® "Dualaire" & "Multiclone"

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